

Biodiversity - 2014: Comparative study of condition factor, stomach analysis and some aspects of reproductive biology of two land crabs: *Cardiosoma armatum* (Herklots, 1851) and *Cardiosoma guanhumi* (Latreille, 1825) from a mangrove swamp ecosystem, Lagos – Nigeria

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Abstract

A total samples of 858 of *Cardisoma armatum* and *Cardisoma guanhumi* collected from the Lagos Lagoon mangrove area of the University of Lagos were studied for their frequency, distribution, growth and sex ratio and a comparative analysis was done on both crabs. Investigation into their length-weight relationships, growth pattern, condition factor, food and feeding habits were administered. The calculated Chi-square (χ^2) test showed that male crabs of *Cardisoma armatum* and *Cardisoma guanhumi* were significantly ($p < 0.05$) different. Crabs belong to the brachyuran infra order family comprising quite 6,793 species peculiarly known for their ten legged creature (decapod) Hosseini et al. [1]. Crabs have flourished to be a predominant icon within the invertebrate fauna due to its ubiquitous existence in most a part of the planet oceans including freshwater, marine even on land [2]. Crabs are least exploited amongst other crustacean and crabs have been commonly found in West Africa. The Gecarcinidae currently consists of 20 species and has been recognized to incorporate 4 [3] or 6 genera [4,5]. The eggs of crabs have to hatch in the sea, where the larvae undergo typical planktonic development [3]. The mass migration of reproductive individuals to the surf for larval release has been reported for several crab species

[6]. The aims of this research was to supply baseline data on condition factor, feeding pattern and sex ratio and to form comparison of populational differences supported morphological analyses of the 2 crabs species: *Cardiosoma armatum* [7] and *Cardiosoma guanhumi* [7].

Materials and Methods

Description of study site

The study was administered within the coast/Mangrove area of University of Lagos Lagoon front which is found opposite the Lagos Lagoon on the geographical platform of 6°26'N and 6°39'N and longitude 3°29'E and 3°50'E (Figure 1). The lagoon is that the largest of the four lagoon systems of Gulf of Guinea and is found at South Western Nigeria. The mangrove swamp connects to the Lagos Lagoon by tidal creek.

Collection of specimens

Specimens were collected at the mangrove part of the Lagos Lagoon of the University of Lagos. They were caught with hand at the same time and place between 7 pm-11 pm to allow for precise readings and analysis of the samples. The collection was done randomly and was collected over a period of six months on weekly bases between February

and July, 2012. The crabs were collected in 2 different stations within the mangrove swamp. A total of 300 crabs were collected from the location and were preserved immediately during a deep-freeze within the laboratory before examination

Laboratory procedure

The crabs were removed from the freezer and allowed to thaw. Excess water was faraway from the specimens using paper

Condition factor

This is the condition of general well-being of a crab. It was studied in relationship to size. The equation for condition factor as follows:

$$K=100W/L^3$$

Where K=condition factor

W=weight of the crab (g)

L=length of the crab (cm)

It is defined as a condition representing how lean or fat the crab.

Food analysis

The crabs were dissected and therefore the stomachs removed for food analysis. Each stomach was studied as a unit so as to supply information on individual variation. The stomach is greenish in color, located underneath the carapace and it is divided into four parts. The stomach contents were examined and scored with regards to whether they were empty, one-quarter full ($\frac{1}{4}$), half full ($\frac{1}{2}$), three-quarter full ($\frac{3}{4}$) or full stomach ($\frac{4}{4}$). The methods of food analysis used were the numerical method and frequency of occurrence method.

Numerical method:

the amount of people of every food items in each

stomach was counted. They were summed up to give totals for each kind of item in the whole sample. Then a grand total of all food items were obtained and every food item was expressed as a percentage of the entire number of food found altogether crabs examined.

Frequency of occurrence method: during this method, stomach content was examined and individual food organisms sorted and identified. The number of stomachs during which each item occur was recorded and expressed as a percentage of the entire number of stomach with food. The method gives information only on the organisms fed on. Its main disadvantage is that it does give information on quantities or numbers;

Reproductive biology

Sex ratio: The crabs were sorted out and sexed using gonopod (a thin abdominal segment) and therefore the gonophores (a broad abdominal segment). These structures were used to identify the male and female respectively. In the male, the abdominal segment is present only on the primary and second abdominal somites and is modified to make copulatory organs. The female differs by having all the somites freely moveable and there is one pair of appendages on each of the 2nd, 3rd, 4th and 5th somites, these form the swimmerets to which the eggs are attached in ovigenous crabs.

Fecundity: this is often defined because the number of ripe eggs within the female before subsequent spawning [7]. The egg mass was carefully faraway from the pleopods using tweezers and washed in running water. The eggs were placed in a 50 ml beaker and filled with seawater. Egg diameter decided using an ocular micrometer before the eggs were separated.

Results

418 and 440 specimens of *Cardiosoma armatum* (Plate 1) and *Cardiosoma guanhumi* (Plate 2) were studied respectively making a complete of 858 species of crabs collected and studied. The specimens were studied for the length and width frequency distributions between the months of February to July, 2012.

Condition factor of Cardiosoma Armatum and Cardiosoma Guanhumi

The condition factor (CF) or coefficient of condition is mentioned because the K factor which indicates the state or overall wellbeing of the *Cardiosoma armatum* and *Cardiosoma guanhumi* was calculated for the 418 *C. armatum* (combined sex) and 440 *C. guanhumi* (combined sex) in relation to size. The K values for the *Cardiosoma armatum* ranged from 3.3 in size group 8.5-9.4 and 30.7 in size group 2.5-3.4. For the *Cardiosoma guanhumi* the K value ranged from 3.1 in size group 8.5-9.4 and 28.6 in size group 2.5-3.4.

Discussion and Conclusions

In studies of population dynamics, high condition factor values shows favorable environmental conditions like habitat and prey availability Moradinasab et al. [8] this assertion shows relevance to the present research work, the condition factor for the *Cardiosoma armatum* and *Cardiosoma guanhumi* features a higher k values of 28.60 and 30.75 for both crabs respectively, though *Cardiosoma guanhumi* had a better condition factor k than *Cardiosoma armatum*, this is often obviously associated with the relative difference in habitat condition and adequate prey inclusion. This is also supported by the works of Lawal-Are and Nwankwo [9] with k-values of *Sersema huzadii* from a tropical estuarine lagoon. The stomach content analysis administered on

Cardiosoma armatum and *Cardiosoma guanhumi* from the Lagos Lagoon, Unilag Water front, indicated that the share empty stomach of *Cardiosoma armatum* and *Cardiosoma guanhumi* were 66(5.79%) and 53(2.05%) respectively. The result was in conformity with Lawal-Are and Bilewu [10] for *Portunis validus* off Lagos's coast Nigeria, the share empty stomach content was lowest in March and April for both *C. armatum* and *C. guanhumi*, this is often thanks to the low condition at the amount of collection.

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