PRESENT STATUS OF *Cardisoma guanhumi* Latreille, 1828 (Crustacea: Brachyura: Gecarcinidae) POPULATIONS IN VENEZUELA

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SUMMARY

Venezuela has a large coastal strip with marine and estuarine environments, especially mangrove ecosystems that are adequate for populations of the land crab Cardisoma guanhumi. *This crab is commercially exploited in our country. Data on its distribution and abundance is restricted and outdated. Due to its ecological en economical importance, the goal of this work is to determine the present population status. Twenty locations were sampled along approximately 75% of the Venezuelan coasts in two sampling periods (November 2009-January 2010, and June-July 2010). Population density was estimated by counting occupied burrows within a quadrate of 80m² in each of the selected locations, and burrow diameters were measured in each of the localities in each of the sampling periods. Grand mean densities were 2.18 burrows/m² in November- January and 1.6 in June-July. No significant density differences were found between sampling periods nor between regions. Burrow diameters were significantly different between sampling periods, being larger in June-July (65.66mm), and were significantly different between western and central, and between western and eastern regions. Burrow densities were higher than those found in Puerto Rico and were also higher with densities reported for the Tucacas-Boca de Aroa area by other authors. The high densities of* C. guanhumi *in Venezuela indicate that these populations are possible not endangered by their present commercial exploitation.*

Land crabs have acquired such an important relevance in biology, that a whole book has been dedicated to them (Burggren and McMahon, 1988). More recently, information on these crustaceans has been widen, dealing with subjects that go from mainly ecological, but also to physiological problems, dietary aspects, as well as abundance estimation methods. For instance, population ecology has been studied in *Gecarcoidea natalis* (Pocock, 1888) (Adamczewska and Morris, 2001), reproduction on *Johngarthia lagostoma* (H. Milne Edwards, 1837) and *Gecarcinus ruricola* (Linnaeus, 1758) (Hartnoll *et al*., 2007, 2010), feeding on *Cardisoma carnifex* (Herbst, 1796) and *Neosarmatium meinerti* (De Man, 1887) (Micheli *et al*., 1991, as *Sesarma meinerti*) and *Ucides cordatus* (Linnaeus, 1763) (Nordhaus *et al*., 2009). One topic that has lately been intensively treated is the manner how to measure population density and animal size in land crabs by using indirect non-destructive methods. The first, by measuring directly crab burrows or conducing visual observations (Warren, 1990; Macia *et al*., 2001; Skov and Hartnoll, 2001; Skov *et al*., 2002; Govender and Rodríguez-Fourquet, 2008); the second by measuring real crab body size (either carapace length or carapace width) and correlating it with the diameter of the burrow opening (Lourenço *et al*., 2000; Lee and Lim, 2004; Govender and Rodríguez-Fourquet, 2008; Schmidt *et al*., 2008).

For several decades and up to the present, the land blue crab, *Cardisoma guanhumi* Latreille, 1828, has been an important target animal for diverse scientific studies (Gifford, 1963; Herreid and Gifford, 1963; Taissoun, 1974; Giménez and Acevedo, 1982; Burggren *et al*., 1985; Wolcott and Wolcott, 1987, among others). Research on its population ecology has been carried out in Venezuela (Taissoun, 1974; Moreno, 1980), Brazil (Botelho *et al*., 2001) and Puerto Rico (Govender and Rodríguez-Fourquet, 2008; Govender *et al*., 2008). Several authors have dealt with the general biology, aggressive, as well as reproductive and moulting behavior, and food selection of *C. guanhumi* (Gifford, 1963; Herreid and Gifford, 1963; Henning, 1975). Works concerning the physiology of this crab have been published by Wolcott and Wolcott (1987), measuring the effectiveness of nitrogen rich food on this species, and Burggren *et al*. (1985), determining ventilation and circulation parameters on specimens on air

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and immersed in water. Also, morphometric relationships are given by Giménez and Acevedo (1982).

It is well known that *Cardisoma guanhumi* plays an important role as a food resource, either domestically or in a large scale use (Taissoun, 1974; Baisre, 2000; Novoa, 2000; Rodríguez-Fourquet and Sabat, 2009). One of the most exploited populations in the Caribbean has been those from Puerto Rico, up to the point that this species was dramatically decreased in this island (Govender *et al.* 2008). Further on, *C. guanhumi* has been overexploited on the island of Cuba (Baisre, 2000), and it has been commercially exploited in Brazil (Pimentel *et al*., 2008), as well as in the state of Veracruz (Mexico) (Guzmán *et al*., 2002). Specifically in Venezuela, since the beginning of the 70's, *C. guanhumi* has been captured and mainly exported alive to Puerto Rico and the USA (Taissoun, 1974, and personal communication from crab exporters in Venezuela). Due to the 2009 world economic crisis, exportation diminished greatly in Venezuela (personal communication from crab exporters in Venezuela). Recently, it has been captured (together with *U. cordatus*) without control and sold illegally by Warao aborigines from the Orinoco Delta, to fishermen from Trinidad and Tobago (Novoa, 2000).

In spite of the amount of biological and fishery published information on *C. guanhumi*, data in Venezuela are not updated and the most recent were given by Taissoun (1974) and Moreno (1980). Results obtained by these authors were restricted to the coastal areas between Tucacas and Boca de Aroa (Falcon state) (Taissoun, 1974) and in Morrocoy (Falcón state) and Laguna de Tacarigua (Miranda state) National Parks (Moreno, 1980). Thus, it is therefore important to determine the existent situation of the population of *C. guanhumi* in Venezuela where it has been commercially exploited for more then four decades, and where no official statistics are available. The goal of this work is to establish the population density, using occupied burrows as an indirect measure, as well as to estimate crab size (using crab burrow diameter as an indirect measure of carapace length), in several locations along the Venezuelan coast, which bears considerable extensions of mangrove areas (Conde and Carmona-Suárez, 2003), known habitats for *C. guanhumi*. Furthermore, density and burrow size will be compared between regions and between sampling seasons, and distances of populations from water resources, vegetation characteristics and associated crabs will also be determined.

Materials and Methods

Twenty three locations along the coastal margin of Venezuela were visited, choosing these either by references on published papers (Taissoun, 1974; Carmona-Suárez and Conde, 1995) or by indications given by other colleagues (Figure 1). From these, twenty sites were sampled between November 2009 and January 2010, and between June and July 2010 (Table I), from the western coasts of Falcón state to the delta of the Orinoco river in Delta Amacuro state. Fourteen sites were sampled in both periods. Vegetation characteristics and associated crab fauna were taken into account and nearest distance to the sea and to water resource were measured, either directly in the field, or using Google Earth™ maps, applying the GPS data of the locations obtained in the field. Population density was measured by counting the burrows. In order to avoid possible density overestimation (Macia *et al*., 2001), burrow entrances were examined for the presence of fresh mud, fecal pellets, crab-extremity tracks and/or fresh leaves at their entrance, in order to assure that they were being occupied by the studied species. Burrow openings that were sealed with fresh or recently deposited mud were also counted, due to the fact that they were inhabited by moulting crabs (Taissoun, 1974). Attention was paid when burrows had two or, seldom, three openings, counting them in these cases as only one. This was easily accomplished by introducing the fingers or hands (when possible) in the burrows that were close to each other and detecting if they were connected or not. A demarcated area of 80m² was searched in

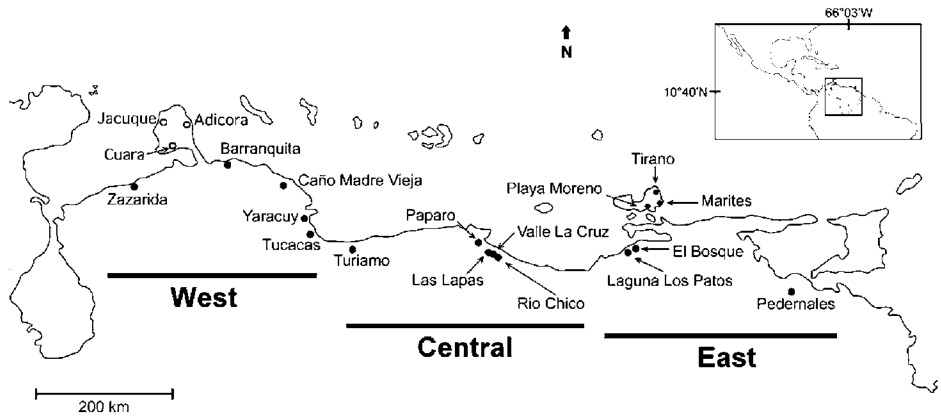

Figure 1. Map of Venezuela showing regions with sampling locations (filled dots) and locations that were only visited (open dots).

TABLE I
LOCALITIES AND THEIR GEOGRAPHICAL POSITIONS, NEAREST DISTANCES (m) TO THE SEASHORE (A) AND TO THE NEAREST WATER RESOURCE (B), AS WELL AS BURROW DENSITIES (#burrows/m²) IN THE NOVEMBER-JANUARY (C) AND IN THE JUNE-JULY (D) PERIODS

Locality	Coordinates	A	B	C	D
Western Region					
Zazárida	11°14'12.65"N, 70°31'1.36" W	32	32	1.55	0.24
Barranquita	11°31'31.35"N, 69°17'21.37"W	42	7	5.48	1.59
Caño Madre Vieja	11°12'6.72" N, 68°28'44.22"W	46	12	1.68	
Tucacas	10°46'54.63"N, 68°19'24.35"W	50	4	2.19	1.41
Yaracuy	10°37'59.12"N, 68°16'25.63"W	64	23	5.38	1.14
Central Region					
Turiamo	10°26'20.0" N, 67°51'09.3" W	626	226	2.89	3.93
Carenero 1	10°32'5.97" N, 66°7'45.78" W	1765	867	3.58	3.61
Carenero 2	10°31'20.52"N, 66°7'57.42" W	1815	200	0.93	0.38
Paparo	10°22'56.77"N, 65°59'53.38"W	1787	9	0.75	0.86
Valle La Cruz 1	10°19'52.78"N, 65°56'16.10"W	1602	87	0.39	
Valle La Cruz 2	10°19'57.61"N, 65°56'10.66"W	1376	30	1.06	
Las Lapas	10°15'11.48"N, 65°52'36.88"W	5208	160	3.37	
Eastern Region					
Laguna Los Patos	10°26'5.13" N, 64°12'1.44" W	225	22	2.29	
El Bosque	10°28'28.11"N, 64°7'29.45" W	8	8	3.1	1.75
Muelle Cariaco	10°28'33.81"N, 63°39'45.05"W	25	25	1.85	0.37
Las Marites 1	10°56'18.92"N, 63°56'54.73"W	4564	340	0.55	0.58
Las Marites 2	10°56'19.38"N, 63°56'56.36"W	4589	375	0.9	0.9
Playa Moreno	10°58'54.16"N, 63°48'53.58"W	37	37	1.03	
El Tirano	11° 6'29.95"N, 63°50'33.57"W	40	11	4.15	3.68
Pedernales	9°48'11.3" N, 62°16'11.1" W	26315	300	0.48	1.96

each of the sampling locations. Between 30 and 60 crab burrow diameters (mm) in each of the sampled quadrates were also measured with a 0.05mm precision caliper taking into account how the animal entered or exit the hole. Measurements were taken at the middle of its width. Crab size was indirectly estimated using the regression results obtained by measuring with a precision Vernier the carapace length of 111 trapped crabs in the locality of Carenero and their respective burrow diameters. Due to the fact that rainfall varies greatly from Eastern to Western Venezuela, where the highest precipitation is reported in the Delta Amacuro (1500-2600mm/year; Warne *et al*., 2002) and the lowest in Falcón state (<200mm/year; Lahey, 1973), localities were grouped according to their geographical situation in the western (from Zazárida to Boca de Aroa, both in Falcón state), central (from Turiamo, Aragua state, to Las Lapas, Miranda state) and eastern regions (from Laguna Los Patos, Sucre state, to Pedernales, Delta Amacuro state), in order to compare sampling regions and sampling periods (densities as well as burrow diameters). Descriptive statistics (mean, standard deviation, standard error) were calculated using the software Statistica™; carapace length-burrow diameter and burrow distance-burrow diameter regression lines were calculated with the least square method (Sokal and Rohlf, 1995) and analytical statistics were carried out using permutational ANOVA (Anderson, 2001).

Results

A total of 1600m² were sampled between November 2009 and January 2010, and 1120m² during June-July 2010, measuring burrow density and size along almost 75% of the coastal line of Venezuela. Burrow density (Table I) varied markedly. The lowest value was found in June-July in Zazárida (western region, 0.24burrows/m²) and the highest in November-January (Barranquita, western region, 5.48burrows/m²). The total means (all regions together) were 2.18 (n= 20, SDEV= 1.57) and 1.6 (n= 14, SDEV= 1.27) for the November-January and June-July periods, respectively (Table II). The highest mean burrow density was found in the western region in the November-January sampling period (3.26burrows/m²), and the lowest also in the western region in June-July (1.10burrows/m²) (Table II). However, analyzing regions and periods simultaneously there were no significant differences between burrow densities (DF= 2, F= 1.969, P= 0.1694). Furthermore, no significant differences were detected between the three regions (DF= 2, F= 0.535, P=0.5941), nor between sampling periods (DF= 1, F= 2.454, P=0.1289).

TABLE II

DESCRIPTIVE STATISTICS OF BURROW DENSITY OF *Cardisoma guanhumi* IN VENEZUELA IN TWO SAMPLING PERIODS (NOVEMBER 2009-JANUARY 2010, AND JUNE-JULY 2010) AND THREE REGIONS.

Region	Sampled area (m²)	Number of locations	Min/Max	Mean	SE
November-January					
West	400	5	1.55/5.48	3.26	0.89
Central	560	7	0.39/3.58	1.85	0.52
East	640	8	0.48/4.15	1.79	0.47
June-July					
West	320	4	0.24/1.59	1.10	0.30
Central	320	4	0.38/3.93	2.20	0.92
East	480	6	0.37/3.68	1.54	0.50

Burrow diameter showed a grand mean of 58.17mm (n= 1213, Min= 14.52, Max= 194.00, SE= 0.681) along the Venezuelan coast, taking into account both sampling periods. Burrow size in November-January and in June-July (Table III) showed means of 51.39mm (n= 636, SDEV= 21.12) and 65.66mm (n= 577, SDEV= 24.17), respectively, and differed significantly between periods, being larger during June-July (DF= 2, t= 19.98, P<0.000). Relative size-class showed an increase in the frequency of larger burrows (from 80mm on) in the June-July period, than in the November-January period, but in both periods the highest frequency laid in the 80-60 burrow size-class (Figure 1). There were no significant differences in burrow size comparing regions with sampling periods (DF= 2, F= 0.399, P=0.673), but there were significant differences between regions (DF= 2, F= 16.031, P=0.0001). These were observed between western and central (DF= 1, t= 5.89, P=0.0001) and between eastern and western regions (DF= 1, t= 3.82, P=0.0001). No significant differences were detected between the central and eastern regions (DF= 1, t= 1.78, P=0.077). For indirect crab size estimation, a total of 111 burrow diameters (B) and corresponding crabs (CL) were measured, achieving the following statistically significant equation: CL= 23.880+0.416×B (r^2= 0.6326, p=0.000; Figure 2). Transforming measured burrow size to estimated carapace length size, *C. guanhumi* showed a grand mean of 48.08mm CL for all sampled locations in both periods, and 45.7, 49.38 and 49.63mm for the western, central and eastern regions (both sampling periods). To correlate burrow size with distance between burrows, 78 pairs and the distance between them were measured, taking care that each pair was approximately the same size. Burrow size varied between 20.1 and 74.0mm (mean= 42.5, SDEV= 12.71) and distance varied between 7 and 99cm (mean= 27.7, SDEV= 15.31). Correlation between mean size of burrow pairs and distance between them was statistically significant (distance between burrows= -3.301+0.729×average burrow size; r^2= 0.366, F= 43.907, p<0.000; Figure 3).

Fidler crabs of the genus *Uca* were the most common associated crabs with the observed *Cardisoma guanhumi* populations along the Venezuelan coasts. They

TABLE III

DESCRIPTIVE STATISTICS OF BURROW SIZE OF *Cardisoma guanhumi* IN VENEZUELA IN TWO SAMPLING PERIODS (NOVEMBER 2009-JANUARY 2010, AND JUNE-JULY 2010) AND THREE REGIONS

Region	n	Min/Max	Mean	SE
November-January				
West	106	15.5/102.0	46.7	1.42
Central	247	16.7/134.0	54.3	1.31
East	231	14.5/158.0	51.5	1.51
June-July				
West	212	25.6/163.0	58.2	1.44
Central	210	24.8/194.0	68.3	1.73
East	155	30.2/160.0	72.3	1.97

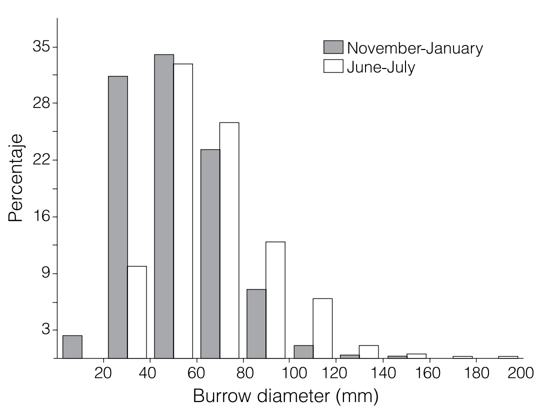

Figure 2. Relative burrow size frequency of *Cardisoma guanhumi* in Venezuela between the two sampling periods.

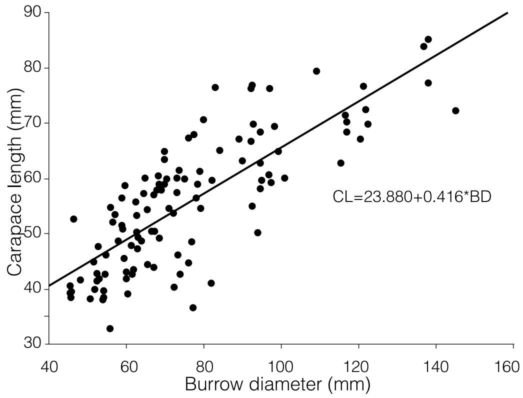

Figure 3. Linear regression between burrow diameter (BD) and real carapace length (CL) of *Cardisoma guanhumi* (n= 111; r^2= 0.6326; p=0.000).

appeared in 9 of the 20 visited localities. Besides *Uca* spp., but very seldom, individuals of *Aratus pisonii*, *Ucides cordatus* en *Sesarma* sp. were also found associated with C*ardisoma* (Table IV). Furthermore, the most common vegetation associated was unidentified terrestrial trees, different types of grasses, *Avicennia germinans* and *Batis maritima*. Besides these, land crabs were also found associated to other mangroves, such as *Rhizophora mangle*, *Conocarpus erectus* and *Laguncularia recemosa* (Table IV). Distance of burrows to the nearest seashore and to the nearest water source varied greatly (Table I). Distance to the seashore spanned between 8 and 26315m (n= 20, mean= 2510.8, SDEV= 5848.7), and distance to the nearest water source ranged between 4 and 867m (n= 20, mean= 138.7, SDEV= 210.6). Water source could be a river, an estuary, a freshwater or marine lagoon, with enough extension and depth to be considered as body of water with long lasting duration.

Discussion

Regardless of visiting 23 locations where populations of *Cardisoma guanhumi* have been reported, in two of them (Punta Jacuque and Cuara, both on the Paraguaná Peninsula, Falcón state) no populations of this land crab were found, in spite of the first one being accounted for by Carmona-Suárez and Conde (1995), and the second one by Taissoun (1974). The third place where no living crabs nor burrows were seen was Adícora (at the eastern side of the Paraguaná Peninsula), but occasionally two or three dead animals were observed. The Paraguaná Peninsula lies on an abnormal dry region (Lahey, 1973), where environmental conditions are harsh. It is possible that the once existent *Cardisoma guanhumi* populations on the Peninsula disappeared, or its number diminished due to the extreme conditions.

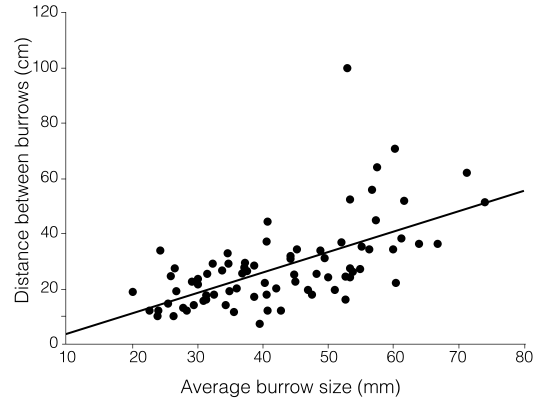

Figure 4. Linear regression of distance between burrows (DB) and average burrow diameter (ABD) of *Cardisoma guanhumi* (n= 78; r^2= 0.366; p=0.000).

Densities observed in the present work (min= 0.24, max= 5.48burrows/m²) were considerably higher than those reported for several locations in Puerto Rico, of 0.18burrows/m² (Govender and Rodríguez-Fourquet, 2008). Herreid and Gifford (1963) indicated a population density in the Dade County, Florida, USA, of up to 1.85burrows/m², a value within the density range determined in the present work. For Venezuela, Taissoun (1974) reported mean crab densities that oscillated between 0.50 and 0.89/m² in the coastal strip from San Juan de Los Cayos to Boca de Aroa, Falcón state. The sites of Caño Madre Vieja and Tucacas, sampled in the present study, are located in this coastal strip, where a burrow density oscillated between 1.41 and 2.19burrows/m² (Table I). These are higher than the densities reported by Taissoun for this region. The coastal axis San Juan de Los Cayos-Boca de Aroa is one of the regions in Venezuela where crabs are commercially extracted (Taissoun, 1974). The results could point out that the measured land crab populations possibly have not yet been threatened by overexploitation. Furthermore, Moreno (1980) estimated burrow densities of 2.46 (Morrocoy National Park, Falcón state) and 5.71/m² (Tacarigua, Miranda state), both protected areas with well developed mangrove forests, two conditions that could possibly explain the high densities. Regarding the similar densities in all the three regions, and between the two periods, the abundance of *C. guanhumi* seems to be relative even

TABLE IV
ASSOCIATED CRABS AND VEGETATION TO *Cardisoma guanhumi* POPULATIONS IN VENEZUELA

Location	Vegetation	Crab species
Western Region		
Zazárida	*Batis maritima*	*Uca* sp.
Barranquita	*Batis maritima*, *Prosopis juliflora*	*Uca* sp.
Caño Madre Vieja	*Avicennia germinans*, *Laguncularia racemosa*	*Uca* sp.
Tucacas	*Avicennia germinans*	*Uca* sp., *Sesarma* sp.
Yaracuy	*Conocarpus erectus*, *Laguncularia racemosa* and grasses	*Uca* sp.
Central Region		
Turiamo	Unidentified terrestial trees	
Carenero 1	*Avicennia germinans*	*Uca* sp.
Carenero 2	*Sporobolus pyramidatus* and other grasses	
Paparo	*Cocos nucifera*, *Musa acuminata*, *Mangifera indica*, palm trees, Poaceae and other grasses	
Valle La Cruz 1	Unidentified terrestrial trees, and grasses	
Valle La Cruz 2	Unidentified terrestrial trees and grasses	
Las Lapas	*Avicennia germinans*	
Eastern Region		
Pedernales	*Rhizophora mangle*, *Avicennia germinans* and unidentified terrestrial trees	*Uca* sp., *Ucides cordatus*, *Aratus pisonii*
Muelle Cariaco	Unidentified terrestrial trees	
El Bosque	*Avicennia germinans, Conocarpus erectus* and grasses	
Laguna Los Patos	*Avicennia germinans*	*Uca* sp.
Las Marites 1	*Avicennia germinans*	*Uca* sp.
Las Marites 2	*Sporobolus pyramidatus*	
Playa Moreno	Unidentified terrestrial trees	
El Tirano	*Conocarpus erectus*	

along the Venezuelan coasts. Nevertheless, this should be taken with caution. Population densities can vary largely among different vegetation environments. For example, in the locality of Carenero (Tables I and III), two different vegetation systems were sampled: a mangrove forest and a grassland area. In the mangrove system, densities were higher than in the grassland, in both sampling periods. Similar results were obtained in Puerto Rico by Govender *et al*. (2008), where crab abundance was significantly higher in mangrove areas than in grassland systems.

The linear regression coefficient of determination obtained in the present work (r^2= 0.6326) was lower than that found (r^2= 0.89) by Govender and Rodríguez-Fourquet (2008), when testing the correlation between burrow size and body size of *C. guanhumi*. A lower correlation could have been due to several factors: The measured burrows in Carenero-Venezuela showed a high diversity and complexity. They varied greatly in shape, being round, elongated or amorphous; also, their consistency at the entrance of the burrows could be very hard or very soft mud, possibly causing measuring errors.

The possible reasons for burrow size differences between regions cannot be explained, but food quality, air temperatures and commercial exploitation, could be factors that might influence animal size. Furthermore, results on burrow size from this work differed with the estimates given by Govender *et al*. (2008) for Puerto Rico, and by Taissoun (1974) in the San Juan de Los Cayos-Boca de Aroa coastal strip in Venezuela, for similar sampling periods (November-January, June-July). The latter author reports body size, but since this and burrow diameter are correlated, values can be taken as a valid measure of comparison. In the present work, burrows were larger in June-July, while in Puerto Rico and in the San Juan de Los Cayos- Boca de Aroa coastal axis no differences were found. No explanation can be given for these differences.

Distances between crab burrows and water resources (fresh, estuarine or marine) varied considerably (4 to 867m). The importance of this fact lies in the accessibility of *C. guanhumi* populations to the phreatic level when building their burrows, which are reported to go as 1.5m deep. In localities such as Turiamo, Carenero, Las Marites and Pedernales, where the longest distances from the burrows to the nearest water resource were found (200-867m), the topography of the area is very low, being nearly flooded during river level rise or high rainy season. An important issue is the distance to seawater, due to the necessity of marine salinities for *C. guanhumi* larvae survival and to achieve complete development (Burggren and MacMahon, 1988). While most of the sampled sites were located within a maximum distance of 3-5km from the seashore and the *C. guanhumi* population (Gifford, 1963; Taissoun, 1974), the sampling location of Pedernales, Delta Amacuro state (not to be confused with the village of Pedernales, which is located near de ocean border of the Orinoco delta) lied far beyond (26315m from the marine coastline). Although the nearest water resource was only 300m and the substrate was partially flooded, the question arises regarding how larvae can be released in waters with adequate salinities to develop properly? Two assumptions can be made: that ovigerous females migrate the enormous distances during the spawning season, or that, combined with migration, larvae survive as they drift to waters with higher salinities.

A considerable coastal line stretch in Venezuela was covered in this study (about 75%), giving a good overall view of the population density and burrow size of *C. guanhumi*. As much as it has been found in the literature, this is the only work in the whole Caribbean area, besides the published papers from Govender and Rodríguez-Fourquet (2008) and Rodríguez-Fourquet and Sabat (2009) for Puerto Rico, where an attempt has been made to evaluate the status of *C. guanhumi* populations region-wide. Due to the economical and ecological importance that this species has had for decades, and that it has been endangered in some of the islands in the Caribbean, studies like in the present one should be undertaken.

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ESTADO ACTUAL DE LAS POBLACIONES DE *Cardisoma guanhumi* Latreille, 1828 (Crustacea: Brachyura: Gecarcinidae) EN VENEZUELA

Carlos Carmona-Suárez

RESUMEN

Venezuela posee extensas costas marinas y estuarinas, en las que prevalecen manglares, los cuales a su vez son hábitats preferidos por el cangrejo de tierra Cardisoma guanhumi. *Este cangrejo es explotado comercialmente en nuestro país. La información sobre su distribución y abundancia está restringida y desactualizada. Dada su importancia ecológica y económica, el propósito de este trabajo es determinar el estado de sus poblaciones. Se muestrearon 20 localidades a lo largo de aproximadamente un 75% de las costas venezolanas durante dos períodos de muestreo (noviembre 2009 a enero 2010 y entre junio y julio 2010). La densidad poblacional se estimó a través del conteo de las madrigueras de los cangrejos dentro de 80m² en cada una de las localidades en cada uno de los períodos de muestreo. Igualmente se midió el tamaño de las madrigueras en cada una de las localidades durante cada período. Las medias de las densidades fueron de 2,18 y 1,6 madrigueras/m² en los períodos noviembre-enero y junio-julio, respectivamente. No hubo diferencias significativas en las densidades entre regiones ni entre períodos. Los diámetros de las madrigueras fueron significativamente diferentes entre los períodos, siendo mayores en junio-julio (65,66mm). De igual manera fueron significativamente diferentes entre las regiones occidental y central y entre la occidental y oriental. La densidad de las madrigueras fueron mayores que las que se reportan para Puerto Rico y las que se reportan para el eje Tucacas-Boca de Aroa en Venezuela por otros autores. Las altas densidades de* C. guanhumi *en Venezuela indican que estas poblaciones posiblemente no estén amenazadas por su actual explotación comercial.*

ESTADO ATUAL DAS POPULAÇÕES DE *Cardisoma guanhumi* Latreille, 1828 (Crustacea: Brachyura: Gecarcinidae) NA VENEZUELA

Carlos Carmona-Suárez

RESUMO

Venezuela possui extensas costas marinhas e estuarinas, nas que prevalecem manguezais, os quais por sua vez são hábitats preferidos pelo caranguejo terrestre Cardisoma guanhumi. *Este caranguejo é explorado comercialmente em nosso país. A informação sobre sua distribuição e abundancia está restringida e desatualizada. Devido a sua importância ecológica e econômica, o propósito deste trabalho é determinar o estado de suas populações. Foram amostradas 20 localidades ao longo de aproximadamente 75% das costas venezuelanas durante dois períodos (de novembro 2009 a janeiro 2010 e de junho a julho 2010). A densidade populacional foi estimada através da contagem das tocas dos caranguejos em torno de 80 para cada uma das localidades em cada um dos períodos de amostragem. Igualmente foi medido o tamanho das tocas em cada uma das localidades durante cada período. As médias das densidades foram de 2,18 e 1,6 tocas/m² nos períodos novembro-janeiro e junho-julho, respectivamente. Não houve diferenças significativas nas densidades entre regiões nem entre períodos. Os diâmetros das tocas foram significativamente diferentes entre os períodos, sendo maiores em junho-julho (65,66mm). De igual maneira foram significativamente diferentes entre as regiões ocidental e central e entre a ocidental e oriental. As densidades das tocas foram maiores que as relatadas para Porto Rico e as relatadas para o eixo Tucacas-Boca de Aroa na Venezuela por outros autores. As altas densidades de* C. guanhumi *na Venezuela indicam que estas populações possivelmente não estejam ameaçadas por sua atual exploração comercial.*