IDENTIFICATION OF INLAND FRESHWATER CRAB SPECIES NICHE AND BIOLOGY; A CASE STUDY OF WETLAND/WATERSHED AREA IN MINNA ENVIRONS

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ABSTRACT

Survey was carried out to identify burrows/holes of crabs in three (3) sites covering three hectares of watershed field in the Main campus of Federal University of Technology, Minna. Two hundred and seven (207) burrows/holes of crabs were identified and 60 were dugged out to collect the crabs, 20 holes per site and 5 holes per sampling in each site, the length of burrows measured between 21.1-95 cm deep. Fifty five (55) crabs were collected, the size of crab varies comprising of (nymphs (10), juvenile (10) and adult (35(fifteen male, twenty female)) indicating their reproductive and growth activities. The crabs were observed resting at the entrance of the burrows at dawn and dusk (6- 8am and 6-8pm). They withdrew to the hole quickly on perceiving any strange sound or movement. Standard chart was used to indentified species. Species identified is *Afrithelphosa monodosa*. Matured male were morphologically different from female, though the size and shape are the same, female have club on their antenna and posses porch at the anterior end. The matured females were gravid between April-May, with oval small eggs of 10 cm diameter, orange in colour 10-20 eggs, clustered and stringed in each porch. The eggs were laid in between May and June, in late June, female porches were emptied indicating the egg were laid. At commencement of rains, the eggs hatched under favourable conditions of more rainfall which provided moist and reduces temperature of the soil. The soil became water logged and burrows filled with water. The commencement of rainfall motivate them to bring out fresh soil cast outside the entrance of the burrows indicating there is a crab residing in that burrow in most cases. They feed vigorously during rainy season and hibernate in dry season. This study shows that crabs ecology and biology has the potentials of being cultured for their great nutritional and resourceful value.

Keywords: Crabs, Wetlands, Niche and Biology.

INTRODUCTION

Crabs are accounted for about one-fifth or 20g/100g of all the foods obtained from the seas, rivers, lakes, and other aquatic sources (Udo and Arazu, 2012). Although, most food sources for humans are provided from land animals, recently crabs have been successfully used as another source of food nutrients especially among coastal dwellers in southern parts of Nigeria. Several studies have indicated that crab is an excellent source of minerals, large range of polyunsaturated fatty acids and high quality proteins in their tissues, among other healthy components (Oluwole *et al.*, 2020). The importation of crabmeat has increased steadily over the past 20 years, with over 300,000 tons of products worldwide (Dima *et al.*, 2016). The biochemical analysis provides important information for facilitating the fattening, or processing of crabs and crab products (Wan Yusof *et al.*, 2020). One of the many relevant factors that influence the consumption of shellfish such as crab, is the quality of the meats (Moruf *et al.*, 2020). More so, nutritional benefits from fin and shellfishes are limited by its rapidly perishable nature and vulnerability to spoilage (Amuneke *et al.*, 2020). Chemical composition of crabs varies greatly among species and from an individual crab to another, depending on age, sex, size, environment, and season (Petricorena, 2014).

Classification

Kingdom:	Animalia
Phylum:	Arthropoda
Subphylum:	Crustacea
Class:	Malacostraca
Order:	Decapoda
Suborder:	Pleocyemata
Infraorder:	Brachyura

Crabs are from the order decapoda. There is wide variety of true crabs of more than 5000 species belonging to 700 genera (Moghal *et al.*, 2015). They occur in wide varieties but despite the difference in varieties, they all have the same basic body plan with three body regions (head, thorax and abdomen), the head and thorax are closely joined together or fused to form the cephalothorax. Decapods are omnivorous and act as scavengers, they eat both plant and animal materials. They are found in brackish and fresh waters in Nigeria, they are of great importance to human health due to their richness in essential lipids, proteins, and other nutrients such as minerals, vitamins

and omega-3 fatty acid, a daily nutrient requirement recommended by the American Heart Association which helps in brain development and gives protection against stroke and heart diseases (Ayanda *et al.*, 2018). Most crabs show clear sexual dimorphism and so can be easily sexed. The abdomen, which is held recurved under the thorax, is narrow and pencil-like in males. In females, however, the abdomen retains a greater number of pleopods (swimming legs, but also used for brooding the eggs) and is considerably wider. This relates to the carrying of the fertilized eggs by the female crabs (as seen in all pleocyemates). In those species in which no such dimorphism is found, the position of the gonopores must be used instead. In females, these are on the third pereiopod (primarily walking legs and are also used for gathering food), or nearby on the sternum in higher crabs. In males, the gonopores are at the base of the fifth pereiopods or, in higher crabs, on the sternum nearby.
Crabs are omnivores, consuming both animal protein and plants. They feed primarily on algae but take any other food, including mollusks, worms, other crustaceans, fungi, bacteria and detritus, depending on their availability and the crab species (Woods, 1993). For many crabs, a mixed diet of plant and animal matter results in the fastest growth and greatest fitness (Buck *et al.*, 2003).

AIM AND OBJECTIVES

The aim of this study is to survey the different species of crab that are present in Federal university of technology Minna and it environs.

OBJECTIVES

- To identify the species of crab found in wetland of federal university of technology, Minna.
- To measure the morphometric characteristics of the species.
- To identify the crab niche.

MATERIALS AND METHODS

Study Area and Sample Collection: The site considered in this research is the Federal University of Technology permanent site Gidan Kwano, Minna, Niger State. It is approximately 11,000 hectares in land mass, and located at about 15 km from the city of Minna. It lies within the Latitude 9.5336° N and longitude 6.4492° E.
A total number of 207 crabs were collected from their burrows by digging at wetlands of permanent site, Federal university of technology Minna, Gidan Kwano Area in April and June 2021. Crabs were taken to the laboratory of animal biology department, Federal university of technology Minna, bosso campus. In the laboratory the crabs were washed to exclude contaminant and identified. The body weights were measured using a Digital scale. The crabs were separated into Big, Medium and Small.

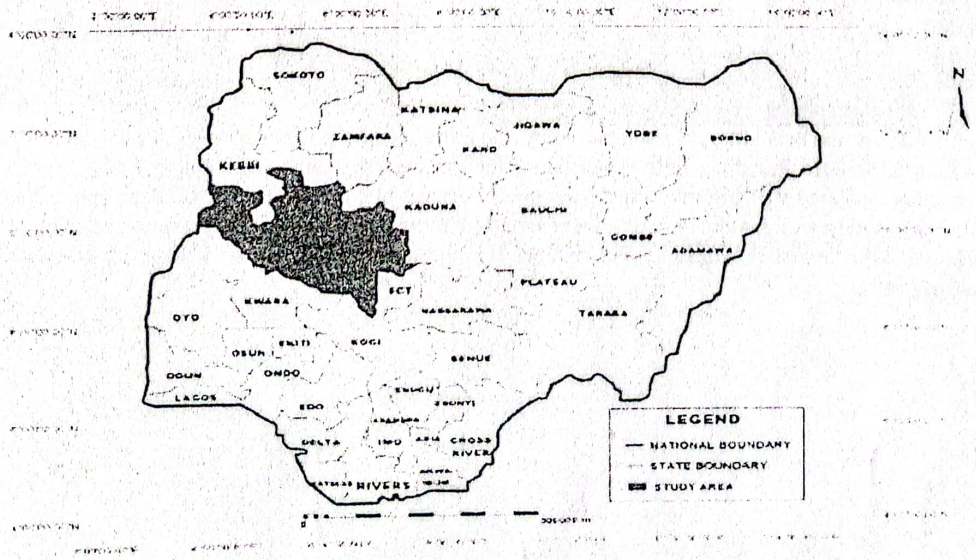

Figure 1: Map of Nigeria showing Niger State

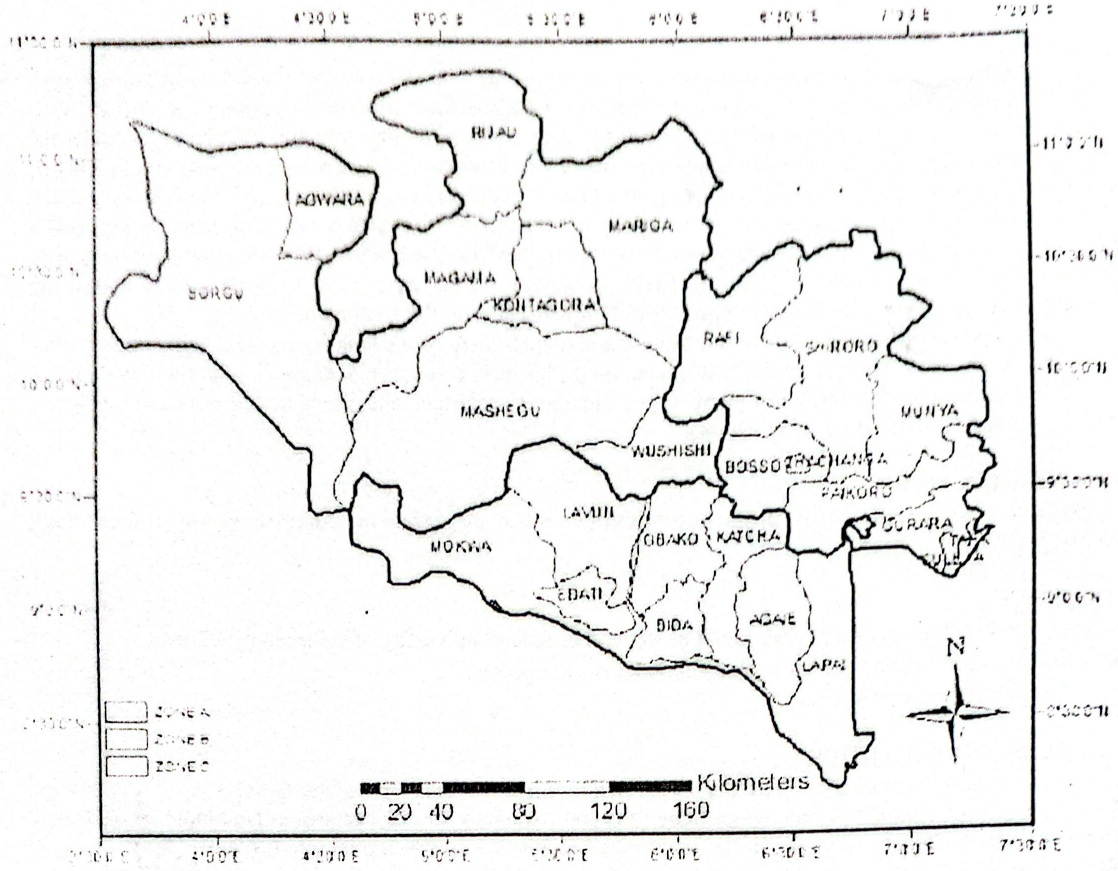

Figure 2: Map of Niger state showing study area

DISCUSSION AND RESULT.

Identification of Crab: The sample crab harvested was identified. The specie identified is *Afrithelphosa monodosa* .(Plate 1 and 2) Crab were identified using pictorial, diagnostic features as well as morphological and meristic features such as color of the body part, external features, shapes of the carapace, dorsal surface (Thoma *et al* . 2014)

The crabs lives in burrows of varying length deep to moisture level. They come out of the burrows at dawn and dusk to take fresh air and prey and withdraw to the hole at any little sound. At the commencement of the rains they clean up the burrow and brought out fresh soil cast at the entrance of the holes. One crab per hole except in two cases that two crabs were found per hole. The mature female were gravid in the month of May, eggs were found on the porch in clustered string numbering 40 per porch, orange in color, oval/pear in shape (plate 3 and 4) and in late June the porches of mature females were emptied indicating the eggs were laid under favorable condition of rainfall with increases moisture and reduces temperature. The burrows become water lodged as raining season progresses

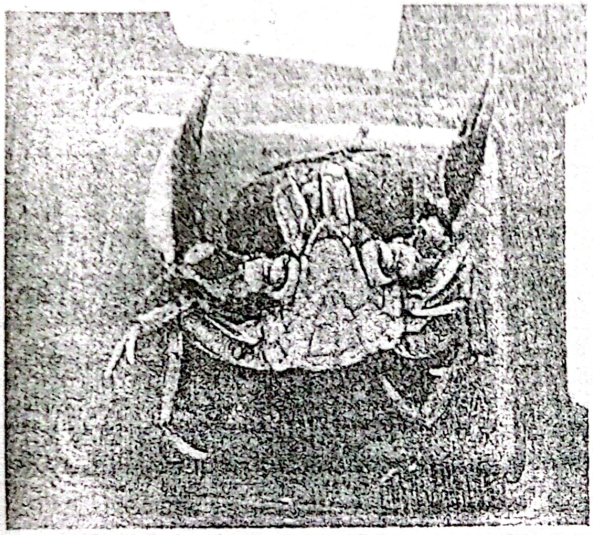

Plate 1: Ventral view of male *Sudanonautes africanus.*

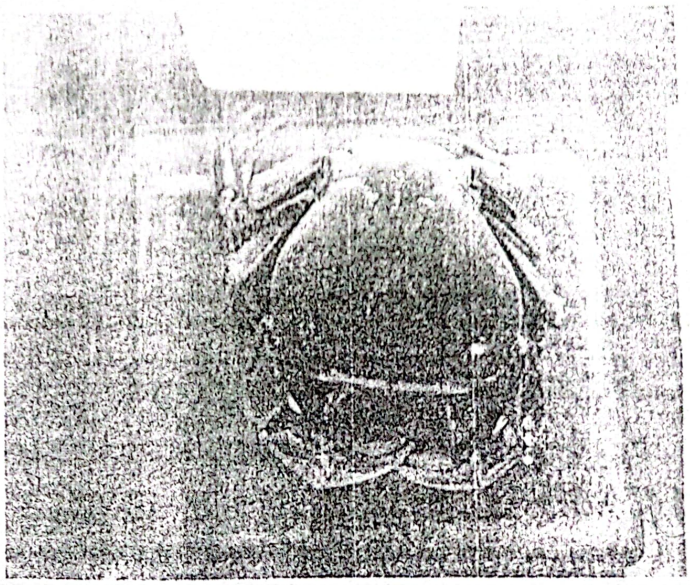

Plate 2: Dorsal view of *Sudanonautes africanus*

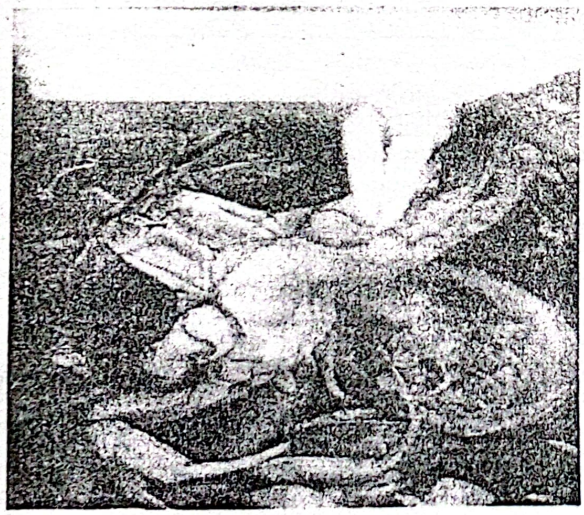

PLATE 3

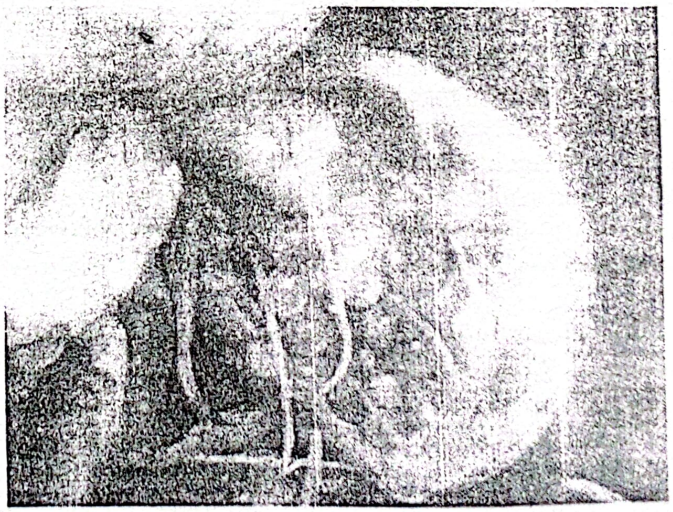

PLATE 4

PLATE 3 AND 4 SHOWING MATURE EGGS IN THE PORCH RESPECTIVELY

The samples collected were divided into small (15-35g) and big (47-62g) table 1.

TABLE 1: Morphormetric measurement of the crabs

CRAB	WEIGHT (g)	CARAPACE LENGTH (cm)	CARAPACE WIDTH (cm)
1	21	3.5	4.8
2	49	5.0	6.5
3	47	5.2	6.5
4	27	4.0	5.0
5	62	7.0	8.0
6	15	3.2	4.4
7	33	4.3	5.8
8	52	6.5	7.5
9	49	5.2	6.4
10	15	3.0	4.2
11	18	3.6	4.5
12	15	3.2	4.4
13	50	5.0	6.3
14	17	3.2	4.3
15	51	6.0	7.0
16	18	3.5	4.5
17	48	5.0	6.0
18	15	3.1	4.2

Table 2 shows the mean measurement of the crab for both April and June. The table revealed that carapace width for both samples are between 6.063 ± 0.45^{a} and 5.1800 ± 0.34^{b}. Also there is significant different between the total body part measurement which is between 16.383 ± 3.73^{a} to 12.9533 ± 2.80^{b}. This difference could be due to different in sub-season of collection of the species. There is little or no difference in the weight which is between 38.250 ± 5.88^{a} to 29.6000 ± 5.43^{a}. There is no difference between the Carapace Length which is given as 4.837 ± 0.48^{a} to 4.0800 ± 0.34^{a}.

Table 2 : The mean body measurement of crabs collected in wetlands of permanent site Federal university of technology in April and June, 2021

Parameters	APRIL	JUNE
Weight (g)	38.250 ± 5.88^{a}	29.6000 ± 5.43^{a}
Carapace Length (cm)	4.837 ± 0.48^{a}	4.0800 ± 0.34^{a}
Carapace Width (cm)	6.063 ± 0.45^{a}	5.1800 ± 0.34^{b}
Total Body Part	16.383 ± 3.73^{a}	12.9533 ± 2.80^{b}

In each row, mean with a common letter are not significantly different ($P>0.05$)

CONCLUSION

The crab species identified in the study is *Afrithelphosa monodosa*, it exhibit norctunal attitude, and amphibious. Reproduce actively by laying egg stored in their porches and live in burrows in dry season and on water during rainy seasons. They feed vigorously during rainy season and hibernate in dry season. This study shows that crabs ecology and biology has the potentials of being cultured for their great nutritional and resourceful value.

REFERENCES

Adeyeye EI (2002).Determination of the chemical composition of the nutritionally valuable parts of male and female common West African fresh water crab *Sudanonautes africanus*. *International Journal of Food Science Nutrition*. 53 (3): 189 – 196.

Appel IJ, Brands MW, Daniels SR, Karanja PJ, Elmer S, Sacks EM (2006). Dietary approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. Hypertension 47 (2): 296– 308.

Ayanda IO, Dedeke GA, Ekhator UI, Etiebet MK (2018). Proximate composition and heavy metal analysis of three aquatic foods in Makoko River, Lagos, *Nigeria. Journal of Food Quality*; 1-6.

Bagde Neelima and Jain Shampa (2016). Ethnozoological Practices of Arthropod Animals by Tribes and Rurals of Chhindwara District of Madhya Pradesh. *India World Journal Pharmaceutics Sci. 5: 1155-1167. 10.20959/wjpps201612-8248*

Banerjee G, Srikanth K, Ramu G, Ramulu Narisimha K. Ethnozoological (2010). Study in a tropical wildlife sanctuary of Eturunagaram in the Warangal district, Andhra Pradesh. *Indian Journal of Traditional Knowledge*; 9(4):701–704. [Google Scholar]

Bello, A.A, Adepoju O. B, Aeneas N. U, Nwauzor G. O, Ugoh U, Omole O.A (2021). Evaluattion of proximate, Fatty Acids, Amino Acids and Total Cholesterol Content of Selected Decapod Crustaceans from Badagry Creek, Lagos, Nigeria. *Asia Journal of Fisheries and AquaticResearch, 12(1), 1-12.*

Cumberlidge N, Fenolio, D.B, Walvoord, M.E. and Stout J (2005).Tree climbing crabs (Potamonautidae and sesarmidae) from phylotelimic microhabitats in rainforest canopy in Madagascar. *Journal of Crustacean Biology* (25) 302-308 .

Dalu T, Sachikonye MTB, Alexander ME, Dube T, Froneman WP (2016). Ecological Assessment of Two Species of *Potamonautid* Freshwater Crabs from the Eastern Highlands of Zimbabwe, with Implications for their conservation PLOS ONE 11.

Das D (2015). Ethnozoological Practices Among Tribal Inhabitants In Khowai District Of Tripura, North-East India J Global Biosci 4: 3364-3372.

Elegbede IO, Fashina-Bombata HA (2013). Proximate and mineral compositions of common crab species (*Callinectes pallidus* and *Cardisoma armatum* of Badagry creek, Nigeria. Poult. Fish Wildl. Sci. 2: 2–5.

Grinang J, Tyan PS, Tuen AA and Das I (2017). Nutrient Contents of the Freshwater Crab, *Isolapotamon hauense* from Sarawak, Malaysia (Borne) Tropical life sci res 28: 75-79.

Grinang J. PhD dissertation. Kota Samarahan (2016). Universiti Malaysia Sarawak. Taxonomy and ecology of freshwater crabs (Crustacea: Decapoda: Brachyura) in Sarawak, Borneo. [Google Scholar]

Holland B, Brown J, Bush DH (1993). Fish and fish products. In: The fifth supplement of McCance and Widdowson's. The composition of foods. Royal Society of Chemistry, Cambridge/London.

IOM (2006). Institute of Medicine. Seafood choices: Balancing benefits and risks. National Academies Press, Washington, D. C. USA.

Krzynowek, K. Wiggein ,K. and Donahuer, P. Cholesterol and fatty acid content in three species of crab found in the North West Atlantic. Food Sci.1982; 47: 1925-1026

Lohani U (2016). Healing with animals in Nepal J Nepal Sci Olympiad 1: 41-47.

Maziya-Dixon B, Akinyele IO, Oguntona EB, Nokoe S, Sanusi RA, Harris E (2004). Nigerian *Food Consumption and Nutrition Survey* 2001-2003 (Summary). IITA, Ibadan – Nigeria.

Moghal, M.M., Pradhan, V., Ladniya, V (2015): Studies on crabs (Brachyura): A Review. *Journal of Advanced Scientific Research*, 4, 585–595.

Moruf HA, Ogunbambo MM and Moruf RO (2020). The relevance of information of shellfish quality on consumers' purchase decision in Lagos metropolis, *Nigeria. Journal of Agricultural Economics, Environment and Social Sciences,* 6, 71-79.

Nodari S, Triggiani M, Campia U, Manerba A, Milesi G, Bruno M, Cesana BM, Gheorghiade M, Cas LD (2011). Effects of n-3 polyunsaturated fatty acids on left ventricular function and functional capacity in patients with dilated cardiomyopathy. J. Am. Coll. Cardiol. 57 (7): 870 – 879.

Omotayo F, Adesola MF, Abayomi OJ (2014). Proximate composition and mineral content of the Land Crab *Sudanonautes africanus*. J. Sci. Res. Reports. 3 (2): 349 – 355.

Omotoso, O.T. (2005). Chemical composition and nutritive significance of the landcrab, *Cardisoma armatum* (Decapoda). *African Journal of Applied Zoology and Environmental. Biology*; 7,68-72

Onadeko AB, Lawal-Are AO, Igborgbor OS (2015). Habitat diversity and species richness of brachyuran crabs off university of Lagos lagoon coast, akoka, Nigeria.The Bioscientist, 3(1): 14- 28

Rai R and Singh NB (2015). Medico-ethnobiology in Rai Community: A Case Study from Baikunthe Village Development Committee, Bhojpur, *Eastern Nepal Journal Institution of Sciences and Technology 20: 127-132. https://doi.org/10.3126/jist.v20i1.13935*

Thoma, B.P., Guinot, D. and Felder, D.L. (2014) Evolutionary Relationships among American Mud crabs inferred from Nuclear and Mitochondrial markers, with comments on Adult Morphology. *Zoological journal of the Linnean society,* 170, 86-109. https://doi.org/10.1111/zoj.12093

Ubesie AC, Ibeziakor NS (2012). High burden of protein-energy malnutrition in Nigeria: Beyond the health care setting. Ann. Med. Health Sci. Res. 1: 66 – 69

Udo JP, Arazu VN (2012). The proximate and mineral composition of two edible crabs *Callinectes amnicola* and *Uca tangeri* (Crustacea: Decapoda) of the Cross River, Nigeria. *Pak journajs Nutrition*. 11 (1): 78 – 82.

Woods, C. M. C (1993). Natural diet of the crab Notomithrax ursus (*Brachyura, Majidae*) at Oaro, South Island, New Zealand. *New Zealand Journal of Marine and Freshwater* Research 27: 309–315. Dima JB, Barón PJ and Zaritzky NE, 2016. Pasteurization conditions and evaluation of quality parameters of frozen packaged crabmeat. *Journal of Aquatic Food Product Technology*, 25, 745-759.