

Mud crab survey and fecundity study around Ebonyi river basin, Ebonyi State, Nigeria

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Accepted 1st August, 2014

Abstract

Population of Ebonyi mud crab is visibly declining in the wild. The need to enhance the population through aquaculture has been addressed earlier by the cultivability and feeding research. There was need to investigate the population density and reproduction capacity, to ensure sustainability of the aquaculture. The survey was carried out in two locations (Ogelegu and Idembia) from March to May 2014. Fecundity was studied with the females irrespective of the location. Abdominal flap and its characteristic U shape were used for identification of the specimens. Matured ones were confirmed by their rounded abdomen. The population of the males was significantly ($P < 0.05$) higher than that of the females. At Ogelegu 32.4% of the catch were females and 67.6% were males. The females accounted for 27.7% of the catch at Idembia, and the males represented 72.3%. There was negative correlation between fecundity and weight, and also between fecundity and size. The highest number of eggs obtained from an individual was significantly lower than the number in marine crab. The abdominal flap and size of egg may be responsible for the small number of crabs obtained from the freshwater. However, size of the female may not be a factor in estimating the number of offspring.

Key words: Mud crab, density, male and female, fecundity, river basin, Ebonyi state.

INTRODUCTION

Mud crabs are hardy organisms. Little is known of disease problems in the juvenile and grow-out phases of their culture. They are easily bred in captivity, which means that selective breeding can be introduced in the near future (SPC, 2011). The wild ones burrow into mud in environments that are sometimes kilometers away from the original habitat. Limitation of adaptive traits, and inability to complete reproduction process on land, are of vital importance in aquaculture and field study. A couple of investigations are ongoing and some regional institutions are working towards popularizing available technologies. However, resources for crab aquaculture in some countries are yet to be harnessed (Akpaniteaku, 2014).

Seed stock for most farms is harvested from the wild. Hatchery production has only recently started contributing to the stock in south East Asia. The future of crab aquaculture is in hatchery produced seeds as wild seed stock will always be a limiting factor (SPC, 2011). The Ebonyi river basin is located in south east Nigeria with

patches of salt deposit, and unestimated population of crabs. The cultivability and feeding of the newly quoted crab (*Potamon ebonyicum*) have been studied (Akpaniteaku, 2013). Study on the reproduction aspects of the crab is so important as to prepare for successful take off to the aquaculture. There is therefore need to study the population density of male and female, and reproduction potentials of the females. The research was aimed at investigating the size of the population in a given area, and fecundity of the females in the river basin.

MATERIALS AND METHODS

Crab specimens used for the study were collected from Ogelegu and Idembia communities of Ebonyi State (Fig.1) during the period of March to May 2014. They were selected from habitats around rivulets and swampy area, with simple gear made by baiting the tip of sliced

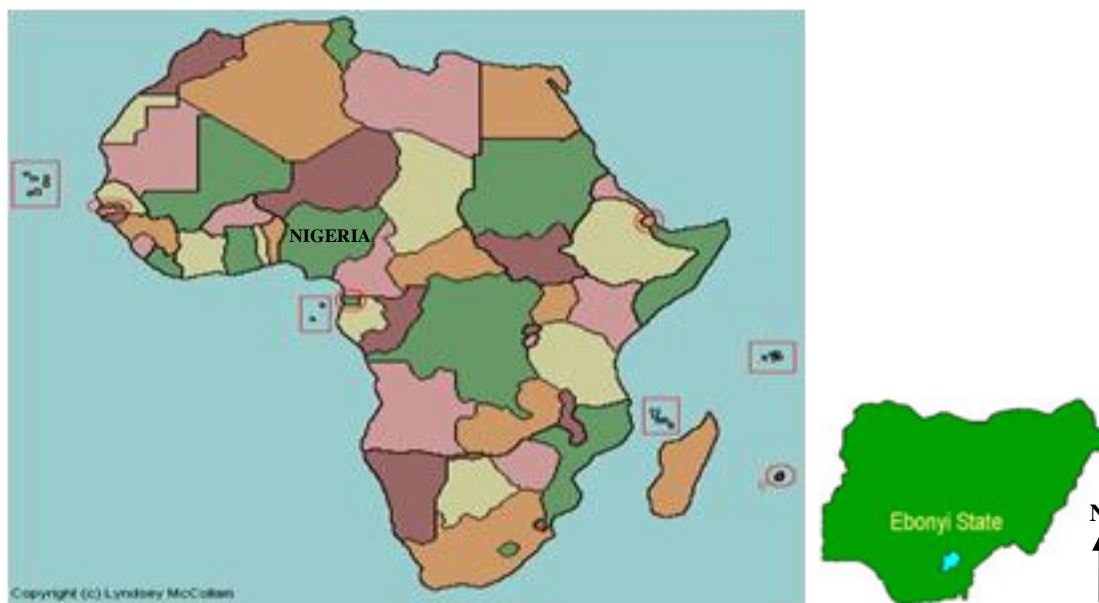


Figure 1: Map of Africa showing the location of Nigeria. Inserted is the map of Nigeria showing the location of Ebonyi State

bamboo with a piece of polyethylene material or small edible insects. Catch were separated into male and female using the methods of Shelley and Lovatelli (2011) and species description by Akpaniteaku (2013): Abdominal flap of the female had the same red colour as the abdomen. Most males had abdominal flap with different colouration (white) from the abdomen. The females were selected by checking the abdominal flap to identify those with the characteristic U shape. Confirmation of maturity was done by methods of Shelley and Lovatelli (2011): Ensuring that the abdomen of the female had changed from the more rounded form. The sponge (egg mass) was located by depressing and pushing forward the first abdominal segment next to the carapace.

The specimens were transported to the Biological Science laboratory for further analysis. They were weighed with triple beam balance of Bran Scientific Instrument England. Weights of the specimens were obtained using the formula:

$$WC = WX - WT$$

Where WC = Weight of crab

WX = Weight of trap plus weight of crab

WT = Weight of trap

Measurement of each specimen was obtained by using meter rule. The eggs were liberated and emptied into Petri dish. Fecundity was obtained by direct enumeration. Data were tabulated and analyzed by regression and correlation coefficient. The fecundity was

plotted against the weight of the specimens and size (carapace width) to establish relationship.

RESULTS

A total of 3480 crabs were sampled from their habitats at Ogelegu and Idembia during the survey. They composed of 1680 and 1800 crabs respectively. The females represented 30% and males accounted for 70% of the total (Figure 2). Comparative catch of the two locations are presented in Figure 2. The percentage abundance of mud crab at the locations followed a definite pattern, with the population of the males significantly ($P < 0.05$) higher than the females. It is shown that 32.4% of the catch at Ogelegu was females and 67.6% were males. At Idembia, the females accounted for 27.7% and the males represented 72.3% of the catch. The largest specimen (female) had carapace width of 5.2 cm and corresponding body weight of 58 g. The smallest specimen had a carapace width of 3.5 cm and corresponding body weight of 43 g.

The variables of relationship were not significant ($P < 0.05$). There was a negative correlation ($r = 0$) between weight of the crabs and fecundity. The fecundity of the specimens examined varied from 49 to 184 eggs (Figure 4).

The figure also shows that wide variation exists in fecundity of crab of the same body weight. The correlation between size (carapace width) of the crabs

and fecundity was also negative ($r = 0$). The least number of eggs was not recorded from the smallest specimen, and the highest number of eggs was recorded from the largest specimen (Figure 4).

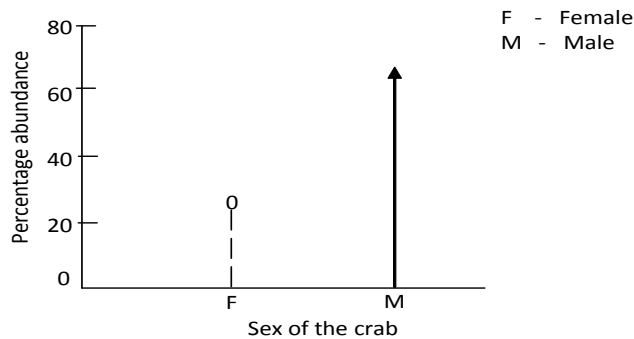


Figure 2: Mud crab catches at Ogelegu and Idembia Communities during the survey.

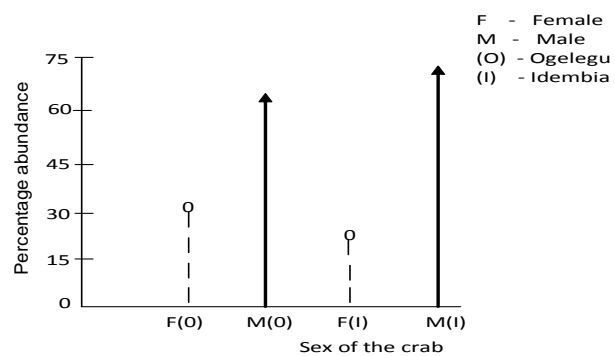


Figure 3: Comparative mud crab catch at Ogelegu and Idembia Communities of Ebonyi State.

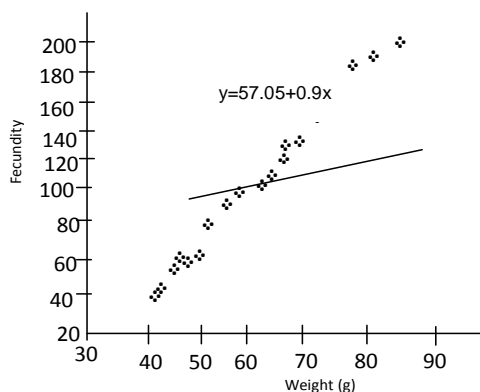


Figure 4: Fecundity and weight relationship of the mud crab

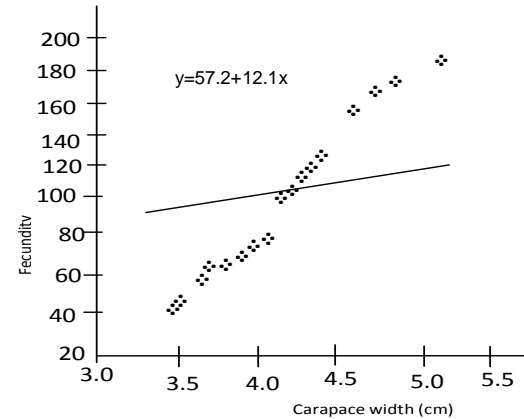


Figure 5: Fecundity and carapace width (size) relationship of the mud crab

DISCUSSION

Large quantity of Ebonyi mud crab (*P. ebonyicum*) was observed around one of the tributaries of Ebonyi River (Akpaniteaku, 2013). The crab specimens collected in the present research is consistent with the specimens sampled during the preliminary work on cultivability and feeding of the crab (Akpaniteaku, 2013). Although several species of mud crab can be found in any one location, according to Shelley and Lovatelli (2011) it appears common that one species makes up a dominant percentage of the overall population. In Greece, four species of Potamon (*P. fluviatile*, *P. potamios*, *P. ibericum* and *P. rhodium*) are still representing local varieties (Maurakis et al. 2004). A few stray crabs are currently observed around homestead in Ebonyi compared to the sizeable number in recent years (Chukwu, Pers. comm. and Akpaniteaku Pers. obs.). The index of population size may possibly be confirmed by the high rate of capture in the basin. Shelley and Lovatelli (2011) reported that densities of mud crab per hectare of mangrove area low of 4-80 through to over 1000. The lower numbers appear to have been based only on the collection of large crabs from size-selective traps that provided biased sample, whereas other higher estimates of total densities have included multiple collecting methods and have sampled crabs of all sizes.

The males are more in number than the females (Figure 2 and 3). Judging by the present research, the sex ratio is 2.33 males to 1.0 female. This may probably indicate that around the river basin, population of male crab is higher than that of the females. Akpaniteaku (2013) reported that the rate of growth of the male crabs with higher initial weight than the females was lower than those of the females. Sexual maturity in the female Potamon may probably be attained when carapace width is about 3.5 cm (Figure 5). The number of eggs found in the abdominal flap varied with weight and size of the specimens (Figure 4 and 5). The highest number of eggs was not necessarily

recorded from the largest specimen, which is in conformity with the regression line (Fig 5). This might also suggest that size of the crab should not be a factor in estimating offspring, especially at the early stage of maturity. However, fecundity is in agreement with the report of Anon (2013) that freshwater crabs show direct developmental and maternal care of a small number of offspring, in contrast to marine crabs which release thousands of planktonic larvae. According to Business ideas (2013) fertility is very high among the marine crabs. As much as a million eggs can be laid, but mortality is also high because of inclement climatic conditions. Bengal, (1966) reported that in fish species wide variation of fecundity existed, even among fish of the same length, age or weight. According to Annune and Bako (1998) the higher fecundity exhibited by fishes provided for loss that could be encountered during the developmental stages. It therefore follow that fishes that have high fecundity do not exhibit parental care. Perhaps relatively low fecundity observed in the present research with crab, was naturally caused by the size of eggs and presence of abdominal flap.

CONCLUSION

The survey of mud crab at Ebonyi River basin showed that population of the males was higher than that of females. The density of sexes during aquaculture should be fixed in a manner that would resolve the disparity. Proper care should be taken to estimate production

during seed multiplication, because size of the female might not reflect the number of offspring. Further study might consider the possibility of obtaining different results with larger specimens.

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