

FOOD AND FEEDING STUDIES OF THE AFRICAN RIVER PRAWN *MACROBRACHIUM VOLLENHOVENII* (HERKLOTS 1857)

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Introduction

Prawn culture is a relatively recent activity, when compared to fish culture. In Nigeria as indeed in most countries of the African region, prawn culture has not been attempted on any serious scale. Many freshwater prawns (palaemonidae) of economic importance have been identified as suitable species for aquaculture in Nigeria (Marioghae, 1987). The African river prawn *Macrobrachium vollenhovenii* has been described to possess the highest commercial potential (Ajuzie and Fagade, 1992). In Indonesia, Chamberlain (1991) described the industry of the freshwater prawn *M. rosenbergii* as being very important with a great increase in the production of 26 166 tonnes in 1983 to 120 000 tonnes in 1990.

Towards the development of a viable prawn farming the food and feeding patterns in its setup natural habitats have to be well known for the setup of an effective feeding strategy. In this study the gut contents of the various stages of *M. vollenhovenii* were analysed and the various food components itemized to evaluate the natural food composition.

Materials and methods

The study was conducted on six different freshwater and two brackish water bodies located in southwestern Nigeria. These consisted of three rivers, two lagoons, one reservoir and two fish ponds. A total of 185 specimens were collected from all the sites. Traps, baits and cast nets were used to collect postlarval and adult prawns and plankton nets for larvae. The specimens were randomly selected, iced and transported to the laboratory for sorting and analysis.

The foregut was dissected, the contents emptied into a Petridish and examined under a binocular microscope. The various food items were identified and classified by

taxon. The occurrence and abundance of each food item was estimated by methods described by Hyslop (1980). The Mann-Whitney U-test was used to test the significance between samples from the different sites.

Results and discussion

A variety of food items was found in the guts of the various stages. These along with the frequency of their occurrence and relative abundance are presented in Table I. The food items varied according to the stages which correspond with the size of the prawn. The larvae were predominantly planktivorous, with algae (*Nostoc Coscinodiscus*, *Chaetoceros*), and diatoms (*Diatoma*) having the highest relative abundance among the food items found in the stomach. ($P < 0.001$ Mann-Whitney U-test).

Table I. Frequency of occurrence and relative abundance of food items found in the gut of the various stages of *M. vollehovenii*

Food item organisms	Species	Stages found			Frequency of occurrence			Relative abundance		
		L	PL	A	L	PL	A	L	PL	A
Blue-green algae	<i>Nostoc</i>	P	-	P	109	-	82	13.58	-	6.72
	<i>Coelosphaenium</i>	P	-	P	86	-	78	9.46	-	4.93
	<i>Phormidium</i>	P	-	-	43	-	-	4.73	-	-
	<i>Aphanizomeron</i>	P	P	-	56	94	-	6.16	3.15	-
Green algae	<i>Mengeotia</i>	-	-	P	-	-	69	-	-	3.73
	<i>Spirogyra</i>	-	-	P	-	-	49	-	-	5.01
	<i>Protococcus</i>	P	P	-	86	95	-	5.15	4.94	-
	<i>Coscinodiscus</i>	P	P	-	118	66	-	12.98	5.84	-
Diatoms	<i>Chaetoceros</i>	P	P	P	112	58	53	14.32	5.06	4.16
	<i>Cyclotella</i>	P	-	-	96	-	-	10.56	-	-
	<i>Flagilara</i>	P	-	-	98	-	-	9.51	-	-
	<i>Diatoma</i>	P	P	P	105	82	64	13.55	4.70	3.47
Protozoa	<i>Volvox</i>	-	P	P	-	91	31	-	5.50	1.08
	<i>Ceratium</i>	-	-	P	-	-	29	-	-	1.30
	<i>Frontonia</i>	-	P	P	-	85	39	-	5.56	1.42
Rotifers	<i>Rotaria</i>	-	P	P	-	114	92	-	14.02	7.20
	<i>Filina</i>	-	P	P	-	109	95	-	10.04	5.65
Copepods	<i>Daphnia</i>	-	P	P	-	113	115	-	11.60	6.35
	<i>Cyclops</i>	-	P	P	-	103	94	-	12.61	5.11
Amphipods		-	P	P	-	86	98	-	9.75	8.43
Polychaetes		-	P	P	-	92	116	-	7.23	9.28
Fish remains		-	-	P	-	-	112	-	-	10.35
Unidentified benthic animals		-	-	P	-	-	95	-	-	16.81

Key: L: larval stage; PL: postlarval stage; A: adult stage; P: present.

The gut contents of the postlarval stage showed that they are zooplankton feeders with rotifers and copepods constituting the highest percentage of occurrence -47% ($P < 0.05$ Mann-Whitney U-test) in the diet. The proportion of animal organisms in the diet showed an increase in the early adult stages and even higher in the sexually matured adults. This shows that there is a change in feeding habit from planktivorous in the larvae to carnivorous. Mature prawns exhibited various feeding habits, as was observed for *M. rosenbergii* by Costa and Wanninayake (1986). The gut contained various forms of detritus (16.81%), animal matter (28.06%), zooplankton (27.11%) and phytoplankton (28.02%). This shows that a prawn can function as a primary consumer, secondary consumer and detritivore in the aquatic system, and hence be classified as omnivores; *M. rosenbergii* also readily accepts a variety of food types. Stomach contents of the juvenile prawns (5.00-7.80cm in length) comprised some remains of benthic animals and fish, as well as detritus which is an indication that they are benthic or detritivore feeder/scavengers. Bigger-sized prawns (7.8cm and above) feed on a wide variety of organisms both plants and animals, but with polychaete, small crustacean, and fish remains accounting for more than 40.85% ($P < 0.01-0.01$, Mann-Whitney U-test). The increase in the animal matter and decrease in the amount of plant matter indicates the adult prawn's relative preference for animal food items, which was also observed by Costa and Wanninayake (1986).

These results also confirm Abby-Kalio's (1990) observation that penaeid prawns are not selective in their feeding. This could explain the occurrence of *M. vollehovenii* in different water bodies from freshwater (fish ponds, reservoir, river, and streams), and brackish water lagoons.

References

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