First Observation on shrimp fishery using brackish water fern, *Acrostichum aureum* traps in a tropical lagoon, south-western Nigeria

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Abstract: Observation on Shrimp fishery using brackish water fern, *Acrostichum aureum* traps in a tropical lagoon, south-western Nigeria examined between June 2004 and May 2005. It was recorded that the fishery of prawn in the lagoon was confined to the rainy season as a reflection of the abundance of the prawns during this season, which itself is due to in-migration from the many fresh water streams emptying into the lagoon. Macrobrachium spp are spatially distributed in the lagoon based on the shelter nature of the area. *Macrobrachium* were more concentrated at Ago – Egun (90kg) and the least concentration were recorded at University of Lagos water front (70.1kg) The occurrence and distribution of prawn in Lagos lagoon were likely to be influenced mainly by hydrology and salinity. The traps were effective because the prawns went under it to feed on the algae and other periphyton encrusting them. However, the effectiveness of *Acrostichum aureum* traps around Ago –Egun and Ikorodu indicates that the species may have preference for areas with influx of organic matter from home chores.
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INTRODUCTION

Acrostichum aureum is a brackish water fern commonly found around major brackish water creeks in South-western Nigeria. Before now, the menace of water weeds has been reported by some authors (NAS 1976; Harley, 1988; Nwankwo and Akinsoji, 1988) as reaching alarming proportions in our waters. This is a global problem but it is particularly severe in tropical nations where warm water and increasing numbers of dams and irrigation projects foster aquatic plant growth.

As the serious negative implications of the presence of aquatic weeds are becoming more widely recognized, scientists, engineers and government administrators are beginning to take action to eradicate these plant species.

The invertebrate fauna associated with the roots of aquatic floating plants in tropical floodplains is very diverse and ecologically important. Most aquatic animal groups are present in this community, from protozoa to crustaceans, including shrimps of the genus *Macrobrachium* (Montoya 2003). *Macrobrachium* species belong to the family palaemonidae. In Nigeria, there are five species of *Macrobrachium* namely, *M. dux, M. felicinum, M. macrobrachion, M.* species A and *M.vollenhovenii* (Powell, 1982). *Macrobrachium* species are known to be common in most fresh and brackish waters of West Africa (Marioghae, 1990). Holthuis (1951) listed at least ten members of the genus from West Africa. Of these, only three, namely, *M. vollenhovenii, M. macrobrachion* and *M. felicinum* are known to be present in the Lagos lagoon (Marioghae, 1982). The first two species, together with juveniles of the southern pink shrimp, *Penaeus notialis* form the basis of the artisanal prawn fishery in the Lagos lagoon (Marioghae, 1990). Marioghae (1990) reported further that the fishing season for *Macrobrachium* species is usually from April to October, although a skeleton fishery exists during the dry season months in the permanent freshwater areas of the lagoon. *M. vollenhovenii* attains a maximum total length of 182mm (Holthuis, 1980) while *M. macrobrachion* individuals rarely exceed 120mm, although a prawn of 138mm has been caught in Lagos lagoon (Marioghae, 1990). Maximum total length for M. felicinum on the other hand rarely exceeds 80mm (Powell, 1982).

Recently, it was observed in Lagos lagoon that aquatic weed can serve purposes in fishing fences for traps (Marioghae, 1990) or as bait for catching fish using hooks. The fisheries potentials of the Lagos lagoon system that have been documented by Fagade (1969), FAO (1969), Kusemiju (1981), Ajayi *et al.* (1989) and Solarin (1998) were based mainly on reports on the performance of the fishing gear types of synthetic origin and well known designs. The use of *Acrostischum aureum* as fishing gear is a new techniques adopted by local fisher folks in Lagos lagoon. So, the objectives of the study were to describe the fishing operation, the species caught, and the financial outcome of the fishing operation to the fisher folks and the longevity of the *Acrostischum aureum* trap.

MATERIALS AND METHODS

The plants was cut from the swampy region of the Abule Agege creek at the back of the computer science building, Faculty of Science, University of Lagos and brought to the beach for construction. Polyamide ropes (210D/6) were bought from Idumagbo Market in Lagos Island. The ropes were cut to 2 metres each and the plants were arranged, trimmed at the apical part of the leaves and then tied at the base of the leaves (Plate 1), these 'traps' were set in different locations in Lagos lagoon (Ago-Egun : 6^0 29' 34.27''N,3^0 23'45.07''E;Abule Agege:6^0 30' 24.6''N,3^0 24' 15.2''E; Unilag lagoon: 6^0 31'28.2''N, 3^0 24' 29.3''E; Ikorodu: 60 36' 33.03''N, 30 28'12. 64''E) at depths ranging from 0.5metres to 1 metre overnight between June 2004 and May 2005. A total number of 30 traps were used in each station at a time.

A scoop net was also constructed with 5mm mesh size polyamide (0.24mm diameter) for catches removal. On the field, the 'traps' were gently approached and the scoop net was lowered under the trap (*A. aureum* bundle), lifted up and the plant were shaken to released the shrimps, prawn and the gobies. The species were identified in the laboratory using available literatures (Fisher *et al*., 1981; Powell, 1982; Schneider, 1990).

For the financial analysis some fisher folks were approached to know the market value of the species caught after which the markets around the locations were visited to verified the prices of the species.

Physico- chemical Parameters

Surface water samples were collected about 10 cm below the water surface. On each trip, temperature (^oC) was recorded with an ordinary mercury thermometer and transparency (cm) measured by a 20cm diameter secchi disc. Salinity ($‰$) was determined using the silver nitrate-chromate method as suggested by Barnes (1980) and pH measured in the field using a BDH Lovibond comparator and cross- checked in the laboratory with a Griffin pH meter model 80. Dissolved oxygen (mgl^{-1}) was measured by the Winkler method (Barnes 1980).

RESULTS

Physical – chemical factors of study areas

The mean of some physico – chemical parameters of the Lagos lagoon are presented in Table 1. The highest salinity was observed at Ago – Egun (Makoko) and the least was at Ikorodu. Also the highest value for transparency was noted at Ago-Egun and the lowest at Ikorodu. Dissolved oxygen at Ago-Egun ($7.0±1.0mgl^{-1}$) was the highest while that of Abule –Agege was the lowest ($4.0±0.7\ mgl^{-1}$). The air temperature had close ranges in all the stations but the highest surface water temperature was recorded at Ago-Egun ($30.3±1.4^oC$) and the lowest was at Abule –Agege ($28.6±1.7^oC$). The pH was comparatively high in all the stations. The deepest area was Ikorodu (4.6±0.5 m) and the shallowest area was University of Lagos water front (1.2±0.7m).

Table 1: Water physico – chemical parameters at the sampling sites

Station	Air temp	Surface water temp	Water depth	Salinity	Transparency	DO	pH
Ago-Egun	29.5±1.3	30.3±1.4	2.4±0.9	15.4±5.1	1.5±0.5	7.0±1.0	7.9±0.2
UNILAG	29.6±1.4	29.5±2.1	1.2±0.7	9.9±6.3	1.0±0.4	6.7±0.9	7.3±0.7
Abule-Agege creek	29.6±1.3	28.6±1.7	1.3±0.4	11.9±9.6	1.0±0.5	4.0±0.7	7.4±0.3
Ikorodu area	29.1±1.6	29.7±1.9	4.6±0.5	4.6±5.1	0.8±0.2	6.6±0.9	7.5±0.4

DO = dissolved oxygen

Cost of constructing New *Acrotischum aureum* trap

The trap is cheap to construct, with only N 1,200 ninety – sixty traps was constructed. The leaves were collected freely from the university of Lagos swamp and the traps were constructed free.

Traps catch analysis

The traps set at Ago Egun and Ikorodu were observed to catch more prawns than those at the University of Lagos water front and Abule Agege creek respectively. More prawns were caught between August and September. The least catch was recorded between January and March while the highest catch was recorded in September.

The species observed in the traps were *Macrobrachium vollenhoevenii, Macrobrachion macrobrachion, Penaeus notialis* and *Batanga lebritonis* (Table 2).

Table 2: The species composition of the trap

Species	Total length size range (cm)		Weight range (g)
M. vollenhoevenii	6.0 – 14.2	(60 – 142mm)	2.5 – 40.2
M. macrobrachion	6.4 – 13.1	(64 – 131mm)	3.0 – 39.5
Penaeus notialis	6.0 – 12.0	(60 – 120mm)	3.5 – 9.5
Batanga lebretonis	3.0 – 8.0	(30 – 80mm)	2.1 – 20.0

The trap remains on the surface of water for the first three days but "shrimps" were caught in all the traps. The more traps, the more shrimps that were caught. This has also been experienced in other fishing traps like basket trap (Marioghae, 1990). As the traps begin to decay more 'shrimps' were caught.

The traps were observed to last for just 2 months before they started decaying and sinking vertically in the water column. Some of the traps set under houses at Ago Egun (Makoko) caught more prawns than those set off University of Lagos beach and Abule Agege creek.

Spatial distributiobn and abundance of prawn *Macrobrachium* spp in Lagos lagoon

Macrobrachium spp are spatially distributed in the lagoon based on the shelter nature of the area. *Macrobrachium* were more concentrated at Ago – Egun (90kg) and the least concentration were recorded at University of Lagos water front (70.1kg) (Table 3).

Table 3: Spatial distributiobn and abundance of prawn *Macrobrachium spp* (Catch in Kilogram) in Lagos lagoon

Months	Ago Egun	University of Lagos water front	Abule Agege creek	Ikorodu area
June 2004	13.6	11.3	11.6	12.8
July	10.9	11.6	11.4	11.8
August	11.1	7.6	7.4	10.3
September	12.6	10.6	11.9	13.3
October	11.4	11.4	12.2	10.8
November	9.7	6.1	7.0	9.9
December	2.0	1.0	0.8	2.5
January 2005	0.2	0.3	1.0	2.0
February	0.3	0.2	0.5	0.6
March	1.0	0.0	0.2	0.4
April	6.1	4.0	5.0	6.0
May	11.1	6.0	6.0	7.0
Total	**90.0**	**70.1**	**75.0**	**87.4**

Marketing analysis of prawns from Lagos lagoon

The price of prawn in Lagos is more or less uniform in all the markets specifically during the rainy season when the shrimp is available in the lagoon.The prices of fresh head-on prawns in various markets on the Lagos lagoon beaches are presented in Tables 4&5.

Table 4: Prices of fresh Head-on prawns in various markets on the Lagos lagoon beaches.

Location	Number of prawn sold for ₦50	Approximation price of 1kg measure (₦)
Makoko (betterlife)	10 – 12	420
Bariga	10 – 14	450
Iwaya	10 – 12	450
Ikorodu	11 – 15	410

The prawn priced highest at Iwaya and Bariga market and least at Makoko betterlife, although these prices fluctuate depend on the availability of the shrimps and the demand.

Table 5: Prawn production in *Acrostichum aureum* trap fishery per fisherman per year.

Location	Prawn weight (Kg)/area	Price N K
Ago Egun	90.0	37,800. 00
University of Lagos water front	70.1	31,545. 00
Abule Agege creek	75.0	33,750. 00
Ikorodu area	87.4	35,834. 00
Total	322.5	138,929.00

Discussion

The observed variations in the physical and chemical features of Lagos lagoon agreed with earlier records (Hill and Webb 1958, Olaniyan 1969, Nwankwo 1991, Solarin 1998).

It was recorded that the fishery of prawn in the lagoon was confined to the rainy season as a reflection of the abundance of the prawns during this season, which itself is due to in-migration from the many fresh water streams emptying into the lagoon. Similar observations have been made in the lagoon by Marioghae (1990). The occurrence and distribution of prawn in Lagos lagoon were likely to be influenced mainly by hydrology and salinity.

The traps were effective because the prawns went under it to feed on the algae and other periphyton encrusting them. This agreed with Marioghae (1982) on the use of frond traps.It could be that they go there for refuge or simply that they have clinging habit as reported by Marioghae (1990). However, the effectiveness of *Acrostichum aureum* traps around Ago –Egun and Ikorodu indicates that the species may have preference for areas with influx of organic matter from home chores.

As the trap beginning to sink more prawn were caught this may be that parts of the leaves are fed on as food by the prawns. This agreed with the report of Mitra and Mukhopadhyay (2005) on the prawn where they reported that prawns are capable of digesting a wide range of foods of both plants and animal origin.

The longevity of the trap is between 1½ and 2 months for the leaves but the ropes can be used over and over again.

The market prices are high compared with meat or fish in the same market. For instance, at the time of this study, while a kilogram of prawn was sold between N 410 and N450, meat price averaged (N300 - N350) and fish prices stood at N250 –N300 per kilogram. Thus weight of the prawn fetched more money (> 30 % greater) than fish. These high prices encourage regular and active *Macrobrachium* fishing

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