

Fishery and Culture Potentials of the Mangrove Oyster (*Crassostrea gasar*) in Nigeria

E.J. Ansa and R.M. Bashir
 African Regional Aquaculture Centre, P.M.B. 5122, Port Harcourt, Nigeria

Abstract: *Crassostrea gasar*, the edible mangrove oyster is a conspicuous inhabitant of the mangrove ecosystem. Being a hard substrate bivalve it is usually found attached to any hard substrate in the estuarine/coastal environment such as prop roots of mangrove trees. It has a wide salinity tolerance range of 10-25 ppt and grows and develops well at temperatures of 23-31°C. The oyster has a high economic value and is widely accepted both locally and on the international markets. The flesh of the oyster could be eaten raw, or after it is boiled or smoked. The mangrove oyster is usually harvested from the wild though it is cultivable. The harvesting is done mainly by the women-folk in Southern Nigeria. The oysters are harvested by cutting the roots of the mangrove trees on which matured oysters are found. Subsequently, these are taken to shore for further processing. The costs of the oysters depend on the extent to which they have been processed. Shell-on oyster costs ₦80 kg⁻¹; freshly shucked oyster meat costs ₦450 kg⁻¹ while the smoked oyster meat costs ₦2,000 kg⁻¹. The economic importance of the mangrove oyster and its culture potentials in Niger Delta are discussed.

Key words: Mangrove oyster, fishery, culture, market prices, economic importance, *Crassostrea gasar*

INTRODUCTION

The oyster is one of the most widely cultivated marine species in the world. As far back as the 1st Century BC, the Romans were reported practicing a simple method of oyster culture by collecting oyster seed growing them for food (CMFRI, 1995a). According to Chew (1986) and CMFRI (1995a) Japan, Republic of Korea, France, USA and China are the highest producers of cultured oyster and together they contribute 78.7% of the world's total. In Nigeria, oyster culture is in its infancy and experimental trials were carried out in the eighties at the African Regional Aquaculture Centre, Buguma station, Rivers State (Afinowi, 1983).

The mangrove oyster is an inhabitant of the estuarine/coastal mangrove swampland of the Niger Delta. It is naturally available in the wild and thrives well in water with 10-25 ppt salinity and temperature range of 23-31°C. The oyster can be cultured in brackish mangrove swamps. Sheltered areas with a water depth ranging from 2-5 m offering protection from strong waves and free from pollution are suitable sites for oyster culture (Afinowi, 1975; Ajana, 1979).

The different methods of oyster culture include rock cultivation, tray culture, rack and string, stake and long line, raft, rack and tray (Ajana, 1979; Afinowi, 1983; Deekae *et al.*, 1994; CMFRI, 1995a; Fujiya, 1970) and

seeds for culture are obtained from natural spat falls. Although there is supply of table-size mangrove oyster from the wild into the market, its potential as a suitable candidate for aquaculture is yet to be exploited. The objective of this study therefore, is to determine market prices, evaluate the fishery and highlight the culture potentials of this species.

MATERIALS AND METHODS

The study was carried out in Port Harcourt which has a regular supply of oysters from the wild on a daily basis. Smoked oysters, freshly shucked oysters and shell-on oysters were purchased at the Creek Road Waterside and Open markets, respectively. The oysters were placed in labeled plastic bags and then transported to the laboratory at the African Regional Aquaculture Centre, Aluu, Port Harcourt for analysis. In the laboratory, the smoked oysters and freshly shucked oysters were weighed separately using BP 310 S Sartorius balance, to determine the total weight.

For the shell-on oysters a total of 100 specimens were measured. Each oyster shell was measured for total length (mm), width (mm) using a pair of Vernier calipers while individual total weight (g) and fresh meat (g) were determined using the Sartorius balance.

The market value kg of the three groups of oysters was then calculated along side the percentage fresh meat weight of total weight (g). Information on aspects of the fishery and market distribution of the oysters were obtained through verbal communication with the fisher folk and marketers of the oysters.

RESULTS AND DISCUSSION

Harvesting, processing and preservation methods: The mangrove oyster is available all-year round and is usually harvested from the wild on a regular basis. The oysters are found occurring in mangrove swamps across the Niger Delta and beyond.

Unlike the fresh water bivalve *Galatea* (= *Egeria radiata*) which is usually harvested by men (Ansa and Ansa, 2004) the harvesting of *C. gasar* is mainly carried out by women. The matured oysters are harvested by cutting the roots of the mangrove trees on which they grow. These roots are then piled up in the dug-out canoes and transported to the shore for processing. On the shore, the women detach the shells from the roots and heap the shells in a basket. These are then sold shell-on to the marketers or further processed by shucking i.e., removal of oyster flesh from shell (Fig. 1). Freshly shucked oyster meat could be sold immediately; otherwise the meat is

smoked on a traditional one-layer smoking kiln using the mangrove roots from which the oysters were detached as source of fuel. Smoking lasts for a few hour to a couple of days depending on the quantity of oysters being smoked and the intensity of the heat. The smoked oyster meat can usually keep (at room temperature) for a couple of weeks depending on the moisture content.

Market value of the mangrove oyster: The individual weight of shell-on oysters available in Port Harcourt markets varied from 10-75 g each with a mean weight of 24.67 g. Corresponding values of oyster meat varied from 0.91-4.85 g with a mean weight of 2.0 g. The mean weight of oyster flesh (meat) was 8.63% of the total weight (i.e., shell + meat) (Table 1). This did not vary much from the values of 10% reported by CMFRI (1995a). The mangrove oyster attains a good size and an estimated 5000 kg ha⁻¹ of oyster meat can be harvested annually (Afinowi, 1983).

From the present study it was observed that shell-on specimens weighing between 10 and 20 g had a higher percent meat weight than those weighing 21 g upwards. This indicates that the oysters should be harvested when they attain of 10-20 g with a corresponding total length of 50-65 mm.

The current market value of the mangrove oyster depends on the extent to which the oysters have been processed. Shell-on oysters purchased from the fisher folk cost only ₦45 kg⁻¹ while in the open markets it is sold for ₦80 kg⁻¹. Fresh oyster meat costs ₦450 kg⁻¹; while the smoked oyster meat costs ₦2,000 kg⁻¹ (Table 2). The value of the shell only is ₦10 kg⁻¹ and when ground to powder it is ₦20 kg⁻¹. Although the price of oysters is relatively expensive, they are in high demand and are usually retailed in small quantities to make it affordable to all.

Economic importance of mangrove oyster: The mangrove oyster, *C. gasar* is economically important as a source of protein to several families in Southern Nigeria. It is widely accepted as food and is in high demand both locally and

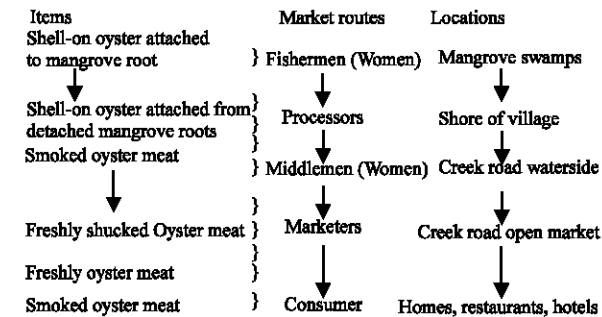


Fig. 1: Trade routes for oysters; (-): Arrow indicating movement of the oysters

Table 1: Sizes of oysters available in Port Harcourt markets

Market	Mean total length (mm)±S.D	Mean shell width (mm)±S.D	Mean total weight (g)±S.D	Mean flesh weight (g)±S.D	Percent meat weight
Creek road waterside market	62.61±11.61	43.72±8.29	24.79±17.30	1.87±1.02	8.65±3.63
Creek road open market	60.23±10.75	41.59±7.30	22.68±18.43	1.76±0.85	8.61±2.94

Table 2: Market prices of the mangrove oysters in Port Harcourt

No.	Item	Price kg ⁻¹	Actual measure used in the market	Equivalent value of measure in kg	Cost measure
1.	Shell-on oysters	a. N45 kg ⁻¹ b. N80 kg ⁻¹	HEAP	8 kg	₦360.00 ₦640.00
2.	Freshly shucked oyster meat	a. Not Available b. N450 kg ⁻¹	-Milk tin (CUP)	-0.16 kg	-N72.00
3.	Smoked oyster meat	a. N1000 kg ⁻¹ b. n2000 kg ⁻¹	Blue band margarine Tin (CUP)	0.10-0.10 kg	₦100 ₦200

Key: a. Creek road waterside market., b. Creek road open market

internationally (CMFRI, 1995a). The meat could be eaten raw (but it is advisable to eat only depurated oysters) or cooked or smoked. In Southern Nigeria oyster meat is used as a delicacy in soups and the flesh has a strong flavour. Apart from the meat, ground oyster shells have been used as a major source of calcium in livestock feeds, being rich in calcium. It is also used in the production of calcium carbide, lime, fertilizer and cement. Housewives use the ashes of shells as an abrasive which is tough on stains and can be used to polish metal wares.

Culture potential: *C. gasar* is a good aquaculture candidate. Unlike other aquaculture species such as clariid catfishes namely *Clarias gariepinus* and *Heterobranchius longifilis* that require technical breeding methods to obtain seed for propagation; spat (seeds) for the spat collectors (cultches). Cultches could be derived from any hard material such as oyster and mussel shells, coconut shells, plastic sheets and concrete slabs (Ajana, 1979; CMFRI, 1995a). Furthermore, the oyster can be cultured directly in the river or in the mangrove swamps. This excludes the drudgery and costs of pond construction. However, facilities in which oysters may be held during culture are available. These materials include perforated plastic trays covered with nets and suspended above the bottom substrates, floating steel cages and net bags.

The mangrove oyster feeds low in the chain and being a filter feeder it derives nutrients directly from the surrounding medium, hence feeding of the oyster is relatively cheaper than feeding of certain aquaculture fish species. The culture duration of tropical oyster species ranges from 7-9, at which time the oyster attains table size and could be handpicked from the cage or tray as the case may be.

CONCLUSION

The mangrove oyster, *C. gasar* can be produced on a larger scale in suitable mangrove swamps of the Niger Delta area of Nigeria. Since the oyster is widely accepted as food the marketability is not an envisaged problem. There already exist local markets for the sale of oysters at

all levels. The culture of the mangrove oyster will therefore go a long way in harnessing this renewable mangrove resource and provide the youths of the Niger Delta with employment in the rural areas; thereby reducing the mass drift of rural dwellers to urban areas.

REFERENCES

- Afinowi, M.A., 1975. The biology of *Anadara senilis* and *Gryphea (Crassostrea gasar)* in West African waters. Report on the symposium on Aquaculture in Africa, Accra, Ghana, FAO, CIFA, TA., pp: 386-400.
- Afinowi, M.A., 1983. The mangrove oyster *Crassostrea gasar*. Its cultivation and potential in the Niger Delta (Nig.) NIOMR Tech. Paper No. 14, pp: 123.
- Ajana, A.M., 1979. Preliminary investigation into some factors affecting the settlement of larvae of the mangrove oyster *Crassostrea gasar* (Adanson) in the Lagos lagoon. *Malacologia*, 18: 271-275.
- Ansa, E.J. and J.E.O. Ansa, 2004. Aspects of the fishery of the freshwater bivalve *Galatea (= Egeria) radiata* in the Niger Delta. *Afr. J. Interdisciplinary Studies*, 5: 12-16.
- Chew, K.K., 1986. Review of recent molluscan culture. World conference on Aquaculture, Venice Italy, 1981. *Eur. Maricult. Soc.*, pp: 173-175.
- CMFRI, 1995a. Edible oyster farming. Published by Central Marine Fisheries Research Institute, India. *Tech. Trans. Series*, pp: 1.
- Deekae, S.N., O.A. Ayinla and I.E. Marioghae, 1994. Possibilities of the culture of mangrove molluscs with special reference to the Niger Delta. NIOMR Tech. Paper No. 96, pp: 20.
- Fujiya, M., 1970. Oyster farming in Japan. In: Kinne, O. (Ed). *Marine Ecology: A comprehensive integrated treatise on life in oceans and coastal water*, pp: 1295-1450.
- Plaziat, J.C., 1984. Mollusc distribution in the mangrove. In: Por, F.D. and I. Dor (Eds). *Hydrobiology of the mangrove*. Dr. W. Junk Publishers, pp: 111-143.
- Quayle, D., 1980. *Tropical oyster culture and methods*. International Development Research Centre, Ottawa, Canada IDRC-Ts 17e, pp: 80.