Dietary Items and Feeding Habits of Sompat Grunt *Pomadasys jubelini* (Cuvier, 1830)

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Abstract: Investigation on dietary items and feeding habits of the sompat grunt *Pomadasys jubelini* off Lagos coast, Nigeria was carried out in order to identify the dietary items of *P. jubelini* and determine its feeding habits. The analysis of stomach content was done by numeric, occurrence and volumetric methods. The results showed that the dietary items of *P. jubelini* were molluscs, crustaceans, fish, annelids and algae. *P. jubelini* had molluscs and crustaceans as the main dietary items which accounted for 44.0% and 41.1% by number, 53.2% and 72.7% by occurrence and 32.0% and 48.6% by volume respectively. *P. jubelini* is a non-piscivorous predatory fish which feeds mainly on other macroscopic animals other than fish. This information will contribute to existing knowledge of the fish biology of *P. jubelini* with particular reference to feeding and will be useful for aquaculture and fishery management of *P. jubelini*.

1. Introduction

Pomadasys jubelini is a common fish species in the Nigerian coastal waters. It belongs to the family *Haemulidae* and is among the economically important fish species for artisanal and trawl fisheries of the coast of Nigeria. It serves as source of food for man especially those living along the coast. It is a demersal fish species that inhabits sandy, muddy bottoms of coastal waters and can be found at depths below 100m. It is mostly found in tropical brackish or marine waters and can also be found in freshwaters (Roux, 1986; Roux, 1990; Schneider, 1990). *P. jubelini* is widely distributed in the Eastern Atlantic Ocean from Mauritania to Angola (Smith and Mc Kay, 1986).

Aside fisheries, information on dietary items and feeding habits of fish species is relevant for aquaculture. Feeding habits and food studies of fish emphasise the food habit and type of food which forms fish diet (Kume et al. (1999) and Hajisamaea et al. (2003) noted that information of feeding habit of a fish community is necessary for understanding the feeding ecology of the fish community. Trophic relationships in the aquatic ecosystem could be identified through information on natural feeding of fish (Abdel-Aziz and Gharib, 2007).

Generally, information on particular dietary items that fish consume and the feeding habit is known through the study of dietary items and feeding habits. Also, preference for dietary items when there is food competition among fish species in a fish community could be known in the aquatic ecosystem.

Dietary items and feeding habits of some fish species off the Lagos coast have been reported by some authors (Kusemiju et al., 1979). Information on dietary items and feeding habits of *P. jubelini* off Lagos coast is scarce. As a result of this paucity of information, the aim of this study was to fill this void in knowledge by investigating the dietary items and feeding habits of *P. jubelini* in Nigerian coastal water off the Lagos coast by identifying the dietary items and their abundance, as well as seasonal variation in dietary items during the study period. It is hoped that this study will enhance our knowledge of the trophic structure of fish community in the Nigerian coastal ecosystem and contribute valuable information which is necessary for successful fishery management and aquaculture of *P. jubelini*.

2. Materials and methods
2.1. Study area

The Lagos coast was the study area for this research. It is a narrow coastal shelf and lies between 14, 816km and 27,780km with a total area of 41,000km^2. The Nigerian coastline is between longitude $02° 53^1$ to $08° 14^1$E and latitude $06° 21^1$ to $03° 55^1$N, covering a distance of 85km and lies in between the Gulf of Guinea. It is a marine environment and salinity is a major limiting factor to the growth of some organisms in the Lagos coast. (FAO, 1969; Nwankwo and Onyema, 2003). Figure 1 shows the Lagos coast.
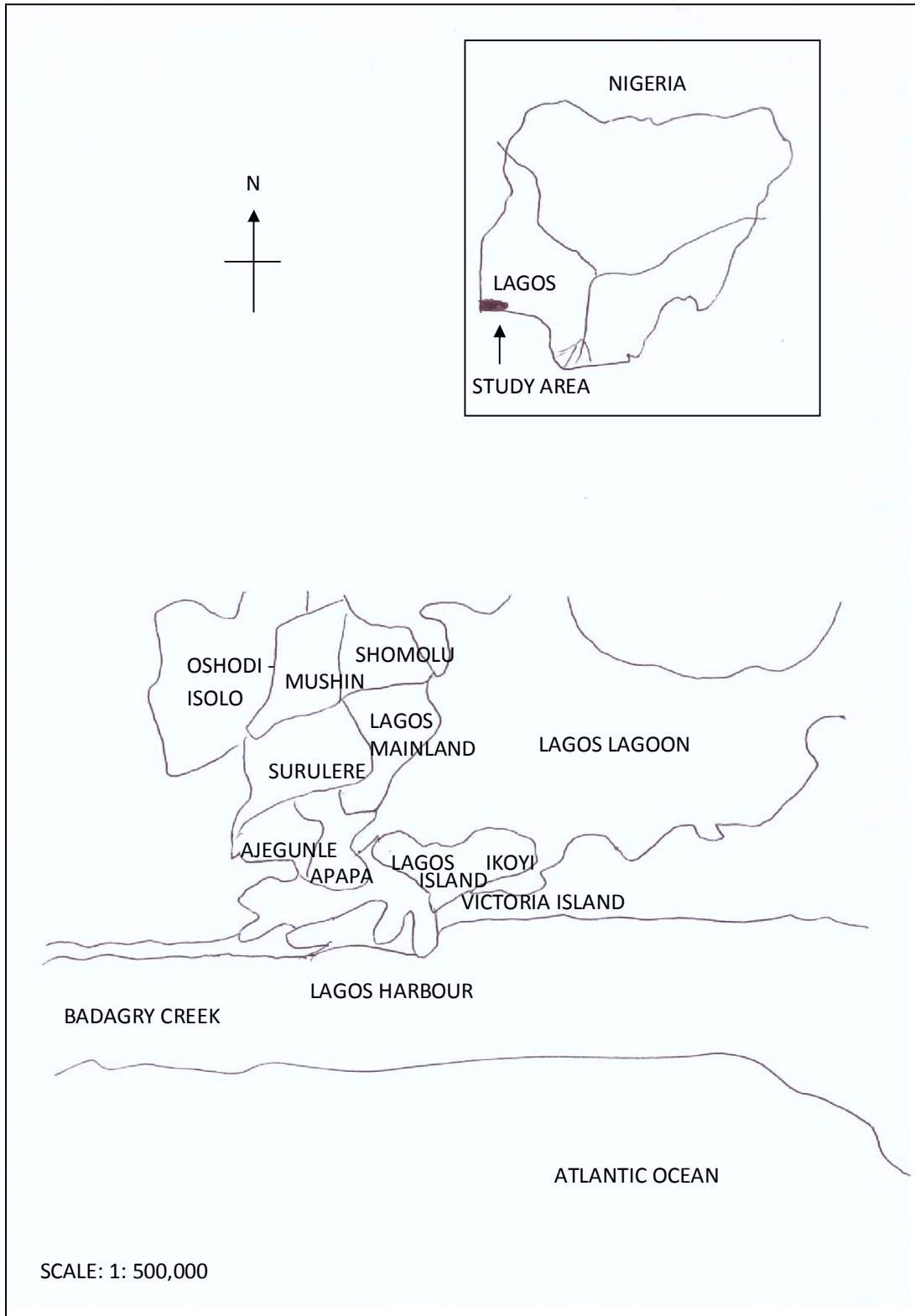
Figure 1. Map of Lagos showing the Lagos coast. Inset: Map of Nigeria showing the study area

2.2. Collection of specimens and sampling

Specimens of *P. jubelini* were purchased from fish mongers at the landing centre of trawlers fishing off the Lagos coast, at the jetty in Ijora Olopa, Lagos, Nigeria. The specimens were collected from January to September 2005. The fish was identified by using the FAO fish identification manual (FAO, 1981). Fifty samples were randomly selected each month, making a total of 450 samples collected during the study period. The samples were transported to the research laboratory and preserved in a deep freezer at -20°C until examination and analysis.

2.3. Morphometric measurements

The specimens were brought out of the deep freezer and allowed to thaw and the body length and weight were measured. Total and standard lengths were measured using a one-meter measuring board graduated in cm. The fish was wiped with a dry napkin before weighing and body weight was measured using a weighing balance (Sartorius model).

2.4. Stomach content analysis

After measurements were taken, each specimen was dissected and the stomach was removed. Fullness of stomach was determined as 0/4 for empty stomach, 1/4 for quarter full, 2/4 for half full, 3/4 for three-quarter full and 4/4 for full stomach. The stomach contents were emptied into a Petri dish containing little amount of water which loosen up the materials for easier identification and estimation of number of organisms which were made under a monocular microscope. The contents were identified to the species level where possible and analyzed by numerical, occurrence and volumetric methods according to Bagenal (1978).

2.5. Numerical method

The number of each type of food items in each stomach was counted and expressed as a percentage of the total number of all food items found in the stomach. This method shows the dietary items occurring in the largest number

2.6. Occurrence method

In this method, the number of stomach in which each food items occurred was counted and expressed as a percentage of the number of stomach containing food. This method provides information on the various types of food organism the fish fed upon.

2.7. Volumetric method

This method involved measurement of the volume of stomach and contents directly after dissection and the contents emptied into a Petri dish. The volume alone was measured to obtain the total volume of food items by subtraction. The volume of the different food items was then expressed as a percentage of the total volume of all food items. This method shows the bulk relationship of the different food items.

2.8. Determination of diet importance

The importance of dietary items was determined by using index of relative importance (IRI). This was calculated according to Cortes (1997) as follows:

$IRI = (N + V) \times O$

Where IRI = Index of relative importance, N= percentage of a certain food organism, V= percentage of food volume, O = Percentage of frequency of occurrence of food.

3. Results
3.1. Food habits
3.1.1. Empty stomach

In *P. jubelini* 40 out of 450 (8.9%) specimens examined had empty stomach. The monthly percentage of empty stomach is illustrated in Figure 2. The percentage of empty stomach was high in April and August for *B. auritus* (24%).

3.1.2. Dietary items

The dietary items of *P. jubelini* are shown in Table 1. Analysis of stomach content of *P. jubelini* showed that molluscs accounted for 44.0% by number, 53.2% by occurrence and 32.0% by volume, while crustaceans accounted for 41.1% by number, 72.7% by occurrence and 48.6% by volume. Other food items were fishes which accounted for 7.3% by number, 22.7% by occurrence and 10.0% by volume. Annelids accounted for 0.4% by number, 8.3% by occurrence and 5.1% by volume. Algae accounted for 5.1% by number and 3.4% by occurrence. Detritus and unidentified mass accounted for 72.0% and 85.1% by occurrence, respectively. Sand grains were also present in the stomach of *P. jubelini*.
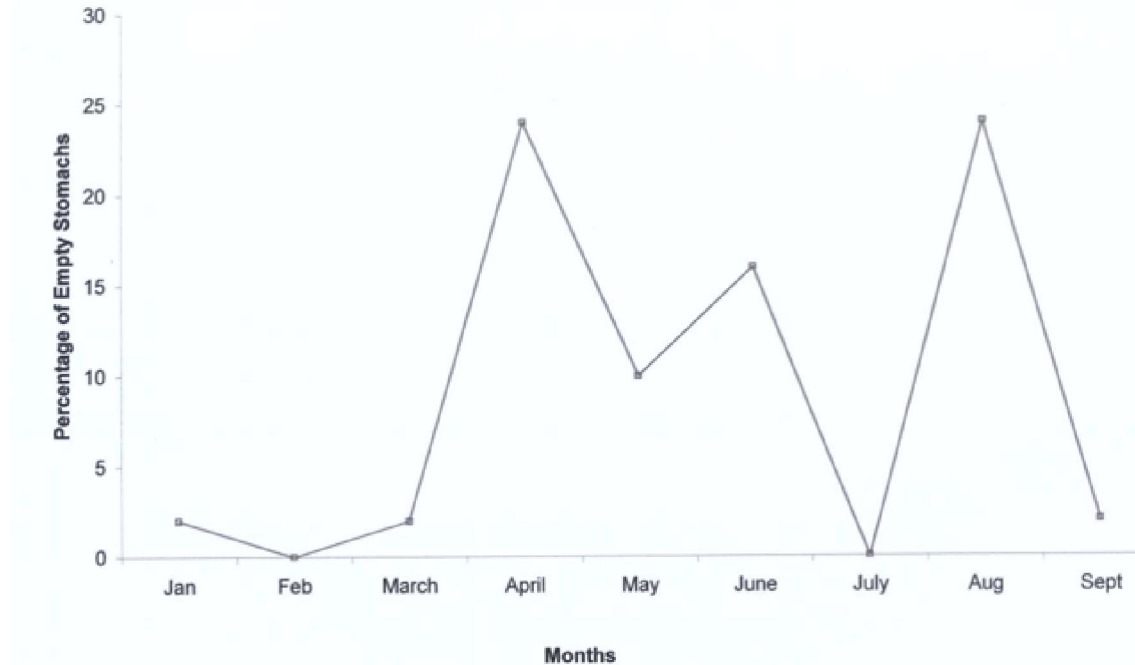
Figure 2. Monthly percentage of empty stomachs of *Pomadasys jubelini* off Lagos coast

3.1.3. Relative importance of dietary items

Table 2 shows the relative importance of dietary items of *P. jubelini* off the Lagos coast.

3.1.4. Seasonal variation in dietary items

The seasonal variation in dietary items was determined by the numerical monthly variation in food items of *P. jubelini*. The seasonal variation of dietary items of *P. jubelini* is illustrated in Figure 3. Molluscs and crustaceans were the most prominent dietary item, followed by fish and then algae in the dry and wet seasons. Annelid was the least prominent dietary item in both seasons.

4. Discussion

P. jubelini in the Lagos coast were feeding well. This was indicated by the relatively low percentage of empty stomach which was observed in this study. In this study, 40 out of 450 (8.9%) fish had empty stomach. A lower percentage (7%) of empty stomach was reported for *P. jubelini* by Ugwumba (1988). Although the sample size of fish used was lower than that used for this study.

The dietary items of *P. jubelini* showed that it is a non- piscivorous predatory fish. This is because molluscs and crustaceans formed the major diet, which is a characteristic of non-piscivorous feeders that feed mainly on other macroscopic animals apart from fish as their main dietary item. The dietary items of *P. jubelini* that was found in this study were similar to those found in *P. jubelini* in Namibia by Bianchi et al. (1993). They reported

that it fed on fish, benthic organism, crustaceans, molluscs and worms. Ugwumba (1988) reported that *P. jubelini* is a non-piscivorous predatory fish that fed mainly on molluscs and crustaceans. This was in conformity with the results obtained in this study.

P. jubelini from creeks in Aiyetoro in Ondo state and Ibeno in Cross river state, Nigeria fed mainly on white shrimp *Nematopalaemon sp.*, penaeid prawn, hermit crab, and polychaete worm. Amphipod, green algae (*Spirogyra sp.*), gastropod shell and insect wings were present in the stomach of *P. jubelini* (Ugwumba, 1988). Similar dietary items were found in the stomach of *P. jubelini* examined in this study. However, amphipod, green algae and insect wings were not present. In this study, sand grains were found in the stomach of *P. jubelini*. Ugwumba (1988) also encountered sand grains in the stomach of *P. jubelini*.

According to Ugwumba and Kusemiju (1994), *P. jubelini* in Lekki lagoon, Nigeria fed on plant materials, invertebrates and fish. The dietary items were similar to those found *P. jubelini* in the Lagos coast. However, plant materials were not present in the stomach of *P. jubelini* in this study.

Dietary items of bastard grunt *Pomadasys incisus* were crustaceans, benthic and planktonic organism which included decapods (shrimp, lobsters and crabs), amphipods, bivalves, echinoderms, polychaetes and euphausiids (Fehri-Bedoui and Gharbi, 2008).

Table 1: Dietary items of *Pomadasys jubelini* off Lagos coast

Dietary items	Numerical method		Occurrence method		Volumetric method	
	Number	Percentage	Number	Percentage	Number	Percentage
Mollusca:						
Aloidis trigona	640	2.0	37	9.0	37.8	7.2
Tympanotonus fuscatus	13	0.0	9	2.2	7.0	1.3
Bivalve shells	13,555	42.0	172	42.0	124.2	23.5
Crustacea:						
Shrimp	63	0.2	40	9.8	52.7	10.0
Shrimp appendages	9739	28.1	121	29.5	82.3	17.5
Hermit crab	76	0.2	42	10.2	44.5	8.4
Crab appendages	3454	10.7	79	19.3	61.6	10.7
Copepod	611	1.9	14	3.4	8.2	1.6
Isopod	4	0.0	2	0.5	2.0	0.4
Fishes:						
Fish	3	0.0	3	0.7	1.8	0.3
Fish flesh	779	2.4	24	5.9	14.9	2.8
Fish scale	385	1.2	20	4.9	10.8	2.0
Fish bone	403	1.2	36	8.8	21.0	4.0
Fish eggs	822	2.5	10	2.4	4.9	0.9
Annelida:						
Nereis sp.	119	0.4	34	8.3	27.2	5.1
Algae:						
Algal filaments	1634	5.1	14	3.4	-	-
Sand grains	-	-	37	9.0	17.3	3.3
Detritus	-	-	295	72.0	-	-
Unidentified mass	-	-	349	85.1	-	-

Table 2: Relative importance of dietary items of *P. jubelini* off the Lagos coast

Dietary items	Percentage number (%)	Percentage of occurrence (%)	Percentage volume (%)	IRI
Molluscs	44.0	53.2	32.0	4043.20
Crustaceans	41.1	72.7	48.6	6521.19
Fish	7.3	22.7	10.0	392.71
Annelids	0.4	8.3	5.1	45.65

In this study, the dietary items of *P. jubelini* were also among those reported for *Pomadasys incisus*. However, *P. jubelini* did not feed on amphipods, echinoderms and euphausiids.

Investigations on the important dietary items revealed that molluscs and crustaceans were the main dietary items of importance. This inference was based on the result of the index of relative importance of dietary items of *P. jubelini*. In this study the dietary items that had no value for percentage number and percentage volume were not considered for evaluation of index of relative importance, this was to give a fair and unbiased result of the important dietary items.
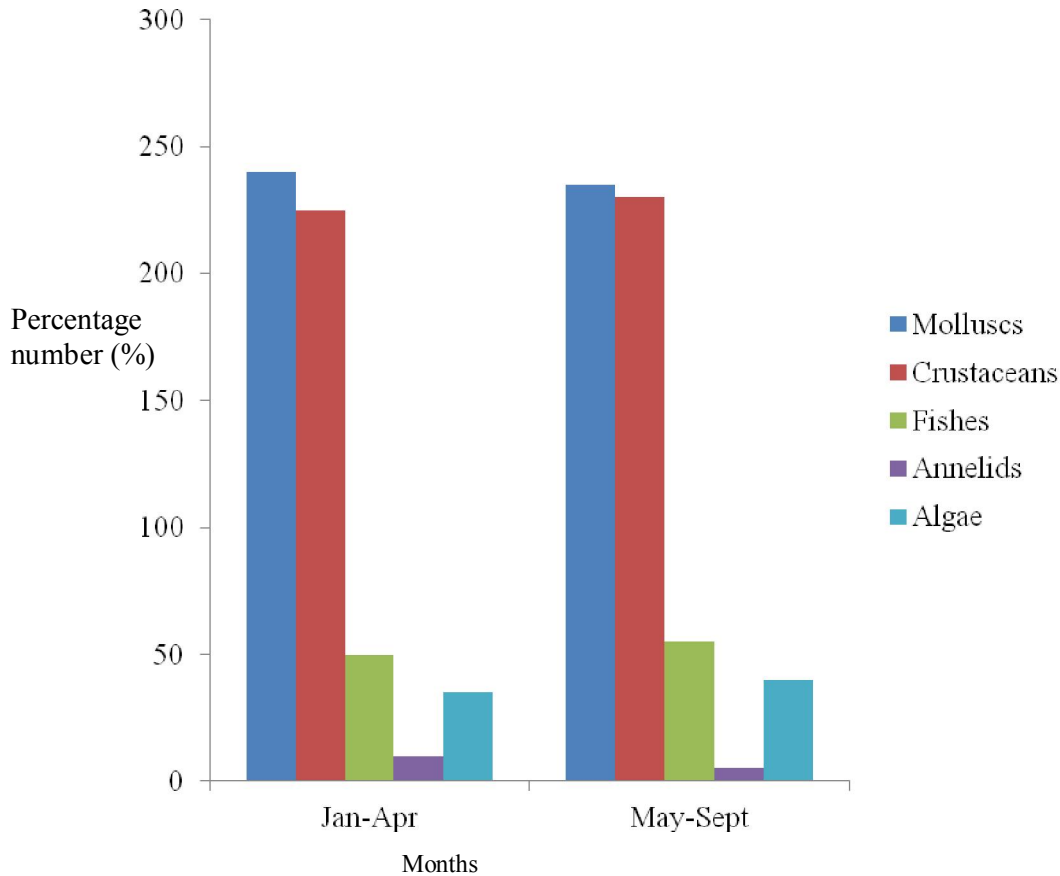
Figure 3. Seasonal variation in dietary items of *P. jubelini*

Molluscs and crustaceans were the most prominent dietary item of *P. jubelini* followed by fish and algae in the dry season (January – April) and wet season (May – September). Annelids were the least prominent dietary item in both seasons. The prominence of dietary items was similar in both seasons, and this indicated that there was no variation in the dietary item and feeding habit of *P. jubelini* in the dry and wet season. It can be deduced that changes in season had no effect on the dietary items and feeding habit of *P. jubelini* in the Lagos coast. Further research is needed to study the effect of seasonal variation on the dietary items and feeding habit of *P. jubelini*.

5. Conclusion

P. jubelini is a non-piscivorous predatory fish that feeds on mollusc, crustaceans, fish, annelid, and algae. The important dietary items are molluscs and crustaceans. This study is significant for fish biology as well as fisheries management and aquaculture of *P. jubelini*.

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