

Feeding Habits of the Nekt *Diplodus noct*, (Valenciennes, 1830) From Southern Sinai, Gulf of Suez, Red Sea, Egypt

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ABSTRACT

The feeding habits of 516 specimens of *Diplodus noct* (family: Sparidae) Red Sea species inhabiting Gulf of Suez, were studied monthly from January to December 2007. The annual diet composition, monthly variations in the diet composition, the variations of diet with lengths and the intensity of feeding were studied. *Diplodus noct* feed on a wide variety of prey types; fish parts, crustaceans, seagrasses, mollusks, algae and copepods. Fish parts and crustaceans were the major food items all year round. Fish parts and crustaceans were found in all length groups of *Diplodus noct*. The fish parts increased as the fish size increased from 8 cm to 15.9 cm then decreased in the older fishes, whereas crustaceans decreased as the size increased. The seagrasses and algae arise in size group 12-12.9 cm, and increased as the fish size increased. Mollusks and copepods were represented in a few months by low values. The diet composition of *Diplodus noct* is an indicative of a generalist feeding strategy. The feeding activities were quite high during spring.

Keywords: Feeding habits, *Diplodus noct*, Gulf of Suez, Red Sea, Egypt

INTRODUCTION

The Gulf of Suez is flat-bottomed with a depth of 55 to 73 m. A gradual fall appears to the mouth of the gulf, where it drops abruptly to a depth five times greater. The gulf represents, therefore, a shallow shelf filled with water of the Red Sea. El-Tur bank lies in the fairway of the gulf, with a general depth ranging from 20 to 35 m (Morcos, 1970). The Gulf of Suez is the principal fishing ground of the Egyptian Red Sea. Fishes landed contributed about 95% of the Egyptian Red Sea catch (Ahmed, 1999). This is attributed to its shallowness and smooth bottom, which makes it highly suitable for fishing by trawlers and seiners. Thus, there is a great activity in the gulf, and extensively exploited (Head, 1987). Sparid fishes were found to inhabit tropical and temperate coastal water, near the shore in shallow inlet and bays less often at moderate depth. Family Sparidae comprise about 22 genera in four subfamilies containing 41 species (Bauchot and Smith, 1983). Twelve species of Sparid fishes are reported in the Red Sea. Three of them are frequently observed in the reef environment; these are

Rhabdosargus sarba,
Acanthopagrus bifaciatus and
Diplodus noct (Randall, 1983).

From the available literature, it was found that few works have been published on the biology of Sparidae in studied area. This is the first study on the feeding habits of *Diplodus noct* (family Sparidae) in the Southern Sinai Coasts, Gulf of Suez, and Red Sea.

Diplodus noct position in the trophic structure of the Egyptian Red Sea, is poorly understood, so, the aim of the present study is defining the trophic relationships between *Diplodus noct* with other invertebrates and fishes in this area, in order to understand the dynamics of this regional ecosystem. Beside, results from feeding habits of *Diplodus noct* may have direct implications for aquaculture.

MATERIALS AND METHODS

Monthly samples of *Diplodus noct* were collected during the period from January to December (2007) by using trammel, gill net and fixed trap (Manasib) from fishing landing site in El-Tur City, South Sinai, Gulf of Suez, Red Sea

FEEDING HABITS OF THE NOKT *DIPLodus NOCT* FROM RED SEA, EGYPT

(Fig. 1) 28° 13' N and 33° 35' E. The study area is located on the Eastern Coast of the Gulf of Suez. The bottom is sheltered sandy characterized by patches of seagrass ecosystem. The area provides the abiotic and biotic conditions of survival to which sparid are adapted. There are a patches of seagrasses dominated by *Halophila stipulacea* and *Holodule uninerves*.

The stomachs of 516 specimens of *Diplodus noct* were examined to study the feeding habits of this species. Annual diet composition, seasonal variations of diet, variations of diet with lengths and feeding intensity were estimated in this study. For each fish specimen, total length measured to nearest 0.1 cm. Each fish was dissected and the alimentary tract removed and preserved in formalin. The degree of fullness of the stomach was assessed by visual estimation and classified as empty, trace, quarter full, half full, three quarter full and completely full respectively as described by Pillay (1952). Food items were identified to their groups. A list of general diet composition was made. Food analysis were made by points of

assessment (Hynes, 1950; Hyslop,1980). The results were statistically analysis subjected to the further statistical treatment according to Godfriaux (1969), in order to give more precise information about food and feeding habits of *Diplodus. noct*.

RESULTS

Annual diet composition

The variety of food items was large (Fig. 2). However, fish parts supplemented by crustaceans formed the major food groups for *Diplodus noct*. Fish parts made up of 60.8% by volume composition of the bulk of the diet, whereas crustaceans coming in the second position of importance and were represented by small prawns and crabs and constituting about 22.9% of all food consumed.

The other food items were seagrasses, *Halophila stipulacea* and *Halophila ovalis* constituting 8.0%. This followed by mollusks (4.1%) which was mainly represented by bivalves and gastropods. The minor food items were algae including green and blue

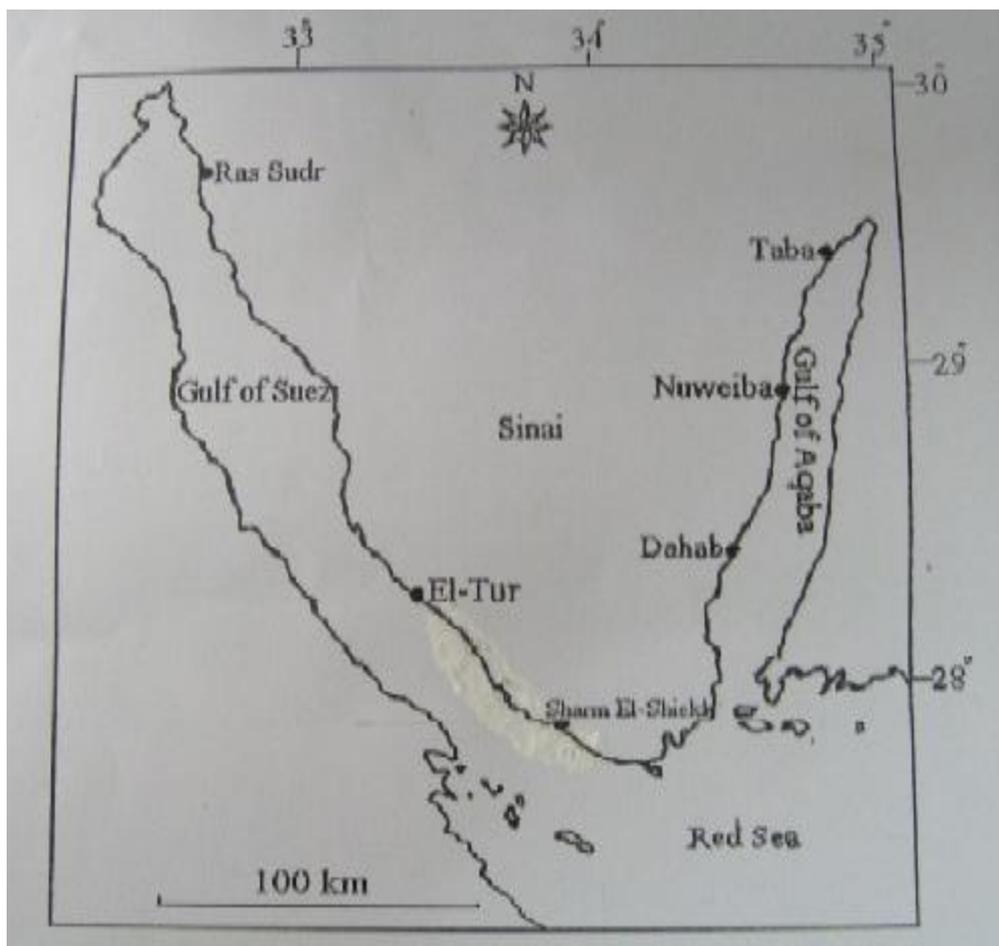


Figure (1): Map showing the location of the El-Tur fishing site in Southern Sinai, Gulf of Suez, Red Sea, Egypt.

green algae (2.5%), and copepods constituted only 1.8%, which were mainly represented by calanoids and harpacticoids.

Monthly variations in diet composition

The monthly variations in food items illustrated in Table (1).

Food items were occurred in all year round during the study. Fish parts constituted the major food items in most months, specially in February and March 95.2% and from May till December ranged from 40.4% in September to 93.1% in November, while it was

FEEDING HABITS OF THE NOKT *DIPLodus NOCT* FROM RED SEA, EGYPT

completely absent during January and April.

Crustaceans the second category in food items occurred in all months except in November and December whereas it constituted 100% in April. The lowest value was recorded in October (2.6%). Seagrasses recorded in all months except April, July and September

and reaching the maximum value in January (56.1%) and the lowest value was observed in December (0.7%). Mollusks ingested showed highest values in September (19.2%) and lowest values in October (1.6%). Algae attained the maximum value in September (21.1%), whereas the minimum value was in June (3.9%). Copepods reached low value in

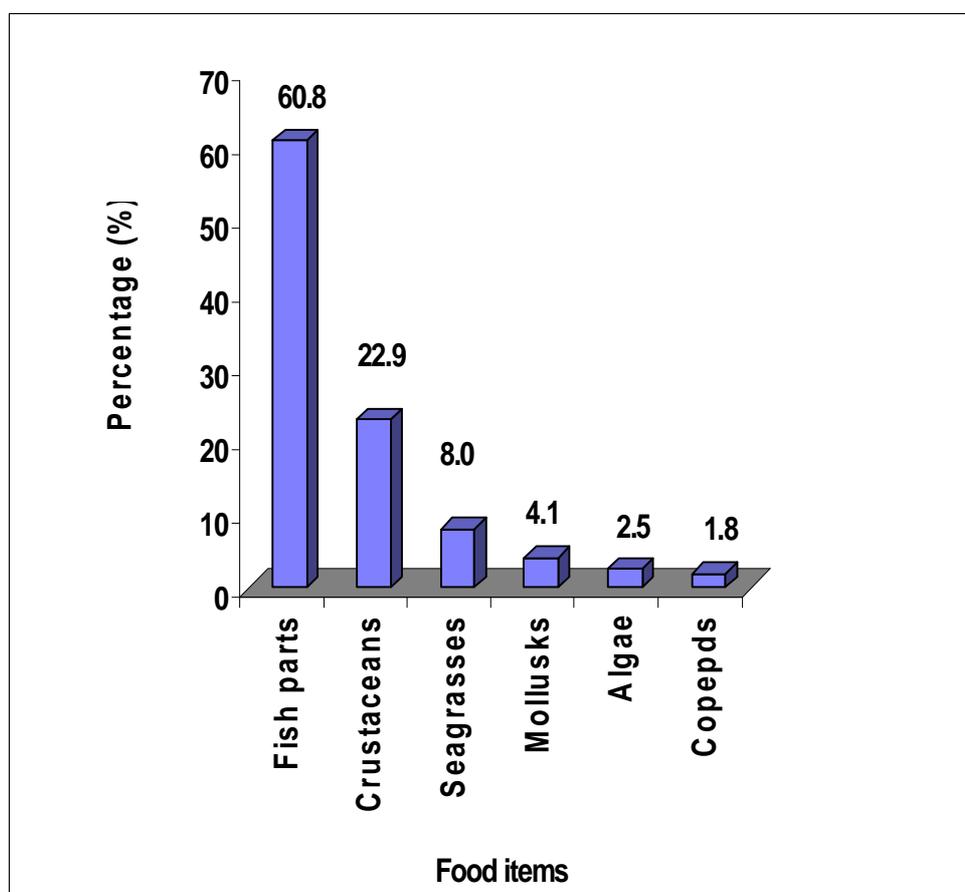


Figure (2): The diet composition of *Diplodus noct* from the South Sinai, Gulf of Suez, Red Sea.

EL-MOR M.E and EL-MAREMIE

Table (1): *Monthly variation in diet composition of Diplodus noct from from the South Sinai, Gulf of Suez, Red Sea.*

Months	No.	Fish parts	Food items				
			Crustaceans	Seagrasses	Mollusks	Algae	Copepods
Jan.	55	A	26.9	56.1	17.1	A	A
Feb.	50	95.2	3.0	1.8	A	A	A
Mar.	50	95.2	1.9	2.4	A	A	0.5
Apr.	8	A	100.0	A	A	A	A
May	48	78.1	8.6	13.2	A	A	A
Jun.	46	67.7	12.9	6.5	9.0	3.9	A
Jul.	49	25.0	71.4	A	A	A	3.6
Aug.	44	63.9	27.7	6.5	1.9	A	A
Sep.	19	40.4	19.2	A	19.2	21.1	A
Oct.	49	87.5	2.6	1.6	1.6	4.2	2.6
Nov.	50	93.0	A	6.9	A	A	A
Dec.	48	85.0	A	0.7	A	A	14.3

Remarks : Data expressed as percentage

A = No food in class occurred

FEEDING HABITS OF THE NOKT *DIPLodus NOCT* FROM RED SEA, EGYPT

March (0.5%) and maximum one in December (14.3%) by volume composition.

Feeding habits in relation to fish size

The variations of food items with length were illustrated in Table (2). The length groups of *Diplodus noct* population classified into thirteen classes ranged from 8.0 cm to 20.9 cm with 1 cm interval. Prey size differed between large size fishes which had ingested the large-size prey, whereas the small sized fishes ingested the small size prey. Fish parts and crustaceans were found in all length groups of *Diplodus noct*. Fish parts increased from 27.1% in size class (8.0 – 8.9 cm), to 76.8% for size group (15.0-15.9 cm). Crustaceans decreased from 72.8% for length group from 8.0 – 10.9 cm to 10.9 % for size group 20.0 – 20.9 cm. Seagrasses rarely found in size group from 8.0 – 10.9 cm, while it was represented 28.1% in size group 20.0 – 20.9 cm. Mollusks decreased from 28.7% in size class (11.0 – 11.9 cm) to 2.7% in size class (14.0 – 14.9 cm) and completely absent in the other length groups. Algae increased from 0.2% in size class (12.0 – 12.9

cm) to 5.5% in size class (20.0 – 20.9cm). Copepods consumed from 10 cm to 13.9 cm ranged from 0.6% to 15.3%.

Feeding intensity

The monthly percentages of empty stomachs and that containing food were given in Table (3). The examination of 516 stomachs of *Diplodus noct* showed about 59.3% were empty and the feeding intensity reached maximum value in March (66.0%) while stomach of empty food reached maximum value in January (87.3%) and September (78.9%).

Monthly variations in diet composition

The monthly variations in food items illustrated in Table (1). Food items were occurred in all year round during the study. Fish parts constituted the major food items in most months, specially in February and March 95.2% and from May till December ranged from 40.4% in September to 93.1% in November, while it was completely absent during January and April.

EL-MOR M.E and EL-MAREMIE

Table (2): *The diet composition of different size classes (cm) of Diplodus noct from the South Sinai, Gulf of Suez, Red Sea.*

Size range (cm)	No.	Fish parts	Food items				
			Crustaceans	Seagrasses	Mollusks	Algae	Copepods
8.0 - 8.9	27	27.1	72.8	A	A	A	A
9.0 - 9.9	26	31.2	68.9	A	A	A	A
10.0 - 10.9	41	44.1	40.6	A	A	A	15.3
11.0 - 11.9	36	44.4	23.1	A	28.7	A	3.8
12.0 - 12.9	71	49.9	20.2	1.2	28.4	0.2	A
13.0 - 13.9	87	73.9	19.3	1.6	3.4	1.3	0.6
14.0 - 14.9	73	74.9	18.9	1.9	2.7	1.7	A
15.0 - 15.9	74	76.8	18.6	2.2	A	2.4	A
16.0 - 16.9	33	69.9	18.4	7.4	A	4.3	A
17.0 - 17.9	25	66.8	16.3	12.2	A	4.7	A
18.0 - 18.9	7	65.6	14.2	15.5	A	4.7	A
19.0 - 19.9	8	55.9	12.2	26.6	A	5.2	A
20.0 - 20.9	8	55.6	10.9	28.1	A	5.5	A

Remarks : Data expressed as percentage

A = No food in class occurred

FEEDING HABITS OF THE NOKT *DIPLodus NOCT* FROM RED SEA, EGYPT

Table (3): *Monthly variations in the intensity of feeding of Diplodus noct from the South Sinai, Gulf of Suez, Red Sea.*

Months	Total no. of stomachs examined	Empty stomachs Empty, Trace and 1/4		Stomachs containing food 1/2, 3/4 and Full	
		No.	%	No.	%
Jan.	55	48	87.3	7	12.7
Feb.	50	28	56.0	22	44.0
Mar.	50	17	34.0	33	66.0
Apr.	8	3	37.5	5	62.5
May	48	28	58.3	20	41.7
Jun.	46	24	52.2	22	47.8
Jul.	49	36	73.5	13	26.5
Aug.	44	24	54.5	20	45.5
Sep.	19	15	78.9	4	21.1
Oct.	49	20	40.8	29	59.2
Nov.	50	33	66.0	17	34.0
Dec.	48	30	62.5	18	37.5
Total No.	516	306		210	
Total percentage			59.3		40.7

Remarks : Data expressed as percentage.

DISCUSSION

Sparid fishes inhabit tropical and temperate coastal water. They found near the shore in shallow inlet and bays less often at moderate depths (Bauchot and Smith, 1983). *Diplodus noct* (Valenciennes, 1830) occupy sandy lagoon or marsh environments in the Red Sea and this species is the most common in the area of study (Ormond and Edwards, 1987).

The food and feeding habits of different species of Sparidae have been studied by many authors, Blaber (1974); Coetzee and Baird (1981); Wassef and Eisawy (1985); Rosecchi (1987); Rosecchi and Nouaza (1987); Papaconstantinou and Caragitsou (1989); Horvath *et al.*, (1990) and Buxton and Clark (1992). Generally, seabreams are carnivorous feed on crustacean, mollusks and small fishes which they crush with their molar form teeth, but some species feed also on seagrasses and algae (Bauchot and Smith, 1983). However, until recently, little are known on these aspects of *Diplodus noct* from South Sinai, Gulf of Suez, Red Sea. The enormous wealth and variety of food available in littoral zone are

paralleled by large number of feeding type found among the fish that live there, from pure herbivores through omnivorous to carnivores (Gibson, 1969). In the current, *Diplodus noct* were found to consume a wide range of food items ranging from fish parts supplemented by crustaceans, seagrasses, mollusks, algae and copepods. Diet selection varies with species and environments (Ellis *et al.*, 1976). In the present study, the *Diplodus noct* usually inhabit seagrasses ecosystem, which characterized by their richness in associated fauna and flora. In the study area, Gab-Alla (1996) recorded sixty species of macro-invertebrates, comprising molusca, crustacean, polychaeta, colentrata and echinodermata beside thirty three species of epiphytic macro-algae. The present study that *Diplodus noct* preferred fishes supplemented by crustaceans, seagrasses, mollusks, algae and copepods. This is in full agreement with Abou-Seedo *et al.*, (1990) on studying the feeding habit of *Diplodus noct* in Kuwait Bay, *Rhabdosargus haffara* in Suez Canal (Al-Oraimi, 1996), some

FEEDING HABITS OF THE NOKT *DIPLodus NOCT* FROM RED SEA, EGYPT

Sparid fishes from Northern Sinai coasts of Red Sea (Ahmed, 1999) and *Diplodus annularis* in Benghazi coast on the Mediterranean Sea (Buzaid, 2008). In the present study, fish parts constituted the major food items in most months. Crustaceans the second category in food items occurred in all months except November and December and ingested by 100% in April and recorded the lowest value in October. Seagrasses recorded in all months except April, July and September and reaching the maximum value in January and the lowest value in December. Mollusks ingested in January, June, August, September and October. Algae attained the maximum value in September, whereas the minimum was in June. Copepods arise in March, July, October and recorded with maximum value in December by volume composition. During the present study fish parts and crustaceans were found in all length groups of *Diplodus noct*. The fish parts increased as the size increased from 8 cm to 15.9cm then decreased in the older fishes, whereas crustaceans decreased as the size increased. The seagrasses and algae increased by increasing fish size. Mollusks and copepods

frequent in few months by low values, from that indicated Crustaceans, Mollusks and copepods showing inverse relationships with algae and seagrasses as the later substitute these food items when the fish become older. these phenomena arise in different sparid species (Abou-Seedo *et al.* 1990; Al-Oraimi; 1996 and Ahmed, 1999) and in other fish species such as mullet species (Broadhead, 1953; Peterson & Shehadeh, 1971; Mohammad, 1982 and El-Mor, 1993).

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العادات الغذائية لسمكة أبو دقه – (دايبلوتس نقط) في سيناء الجنوبية– خليج السويس – البحر الأحمر

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تم دراسة العادات الغذائية لسمكة أبو دقه – (دايبلوتس نقط) من عائلة الأسبرادى وهى من أسماك البحر الأحمر والقاطنة بخليج السويس وتمت الدراسة على 53216 عينه أسماك مجمعه شهريا في الفترة من يناير وحتى ديسمبر 2007 بواسطة شبك الطبقة الواحدة (الخيثومية) والثلاث طبقات (الكنار) من منطقة الطور بخليج السويس. و تم دراسة العادات الغذائية وتغيراتها الموسمية والتغيرات الملحوظة في نوعية وكمية الغذاء بالنسبة للطول وشدة الاغتذاء , وقد أظهرت الدراسة أن شدة الاغتذاء منخفضة في الأسماك تحت الدراسة و تزيد شدة الاغتذاء في الربيع. وقد وجد أنها تتغذى على أجزاء الأسماك والقشريات والأعشاب البحرية والرخويات ومجذافيات الأقدام. كما أظهرت الدراسة أن أجزاء الأسماك والقشريات هي الغذاء الأساسي خلال شهور الدراسة وفي كل الأطوال. ولقد أوضحت الدراسة أيضا أن نسبة القشريات والرخويات ومجذافيات الأقدام تقل بزيادة الأطوال بينما تزيد نسبة التغذي على أجزاء الأسماك والأعشاب البحرية والطحالب بزيادة الأطوال.