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Food Type of Cattle Egret in Tanta District Gharbia Governorate during Year 2015

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ABSTRACT

This study aims to classify the kinds of food for Cattle egret and indications of diversity in Tanta district, Gharbia Governorate during 2015. Sixteen individuals of the Cattle egrets were obtained by shooting them randomly. The specimens were dissected and the stomach content of each bird was weighed and numbered.

Food type for birds consists of 33 animal taxa follows 25 families, 16 orders and seven classes. Class insecta constituted the main food in terms of number%, weight% and size% (83.9), (62.62) and (47.92). Class Chilopoda included one species *Scolopendra* sp. represented the lowest values (1.1, 0.09, and 0.067) for number%, weight% and volume% respectively. The index of relative importance (IRI) for insects = 4, 28.24% which was the most important component in quantity and frequency of occurrence. For biodiversity indications; Shannon-Weiner Diversity Index (H') was 2.83, whereas Simpson's Diversity Index (D) was 0.91, species richness Margelef's d (1958) was 4.63 and species evenness was 0.81. Finally; the biodiversity (diversity index's and species richness) of prey species in food of Cattle egret is mainly due to the area rich vegetation , variety of habitats and crops that plays an important role for the existence of these species and provide the main source of food.

Key words: *Cattle egret – Food –Stomach - Diversity*

INTRODUCTION

Diet studies deal with a fundamental aspect of the biology of organisms and provide important information for an array of evolutionary, ecological, and conservationist questions. Such studies identify food resources that provide necessary nutrient and energy contents, and which may be consumed in a more or less selective manner in relation to their availability **(Rodway and Cooke 2002)**. Insects were the main prey of Cattle egrets (*Ardeola ibis* [*Bubulcus ibis ibis*]) **Richardson and Taylor (2003).** Fishes, crickets and other insects were the most important items all over the

year of order Ciconiformes **Mugica *et al.* (2005).** The food of Cattle egrets at the landfill site was monotonous (dipteran larvae) however, at the grassy habitat, Cattle egrets fed on a diversity of prey including insects and amphibians. At the silted drain, although dipterans dominated the food, Orthopterans and Odonates were also consumed **Abigail *et al.* (2013)**. Orthoptera, grass hopper, Crickets, katydids, and roaches in Cattle egret constituted 78% of prey number and biomass **Fellow *et al.* (1987)**. Order Hymenoptera, Orthoptera and Coleoptera constitute main insect orders whose fragments in the diet of insectivorous passerines and the Cattle egret **Mwansat *et al.* (2015)**.

The trophic spectrum of Cattle egret was made up of 17 taxonomic entities, mainly insects (IRI=15,000), among which Orthopterans were the most numerous followed by spiders and amphibians (IRI=250) **Ducommun *et al.* (2008)**. Cattle egrets at the grassy habitat recorded the highest dietary diversity (H' = 0.62). With regard to the type and amount of prey consumed by Cattle egrets at the landfill sites and silted drain, these serves as major biological agents in the ecosystem **Abigail *et al.* (2013)**.

MATERIALS AND METHODS

During the study period 16 individuals of the Cattle egrets were obtained by shooting them randomly using a gun at Gharbia Governorate.

The specimens were dissected at the laboratory, and the stomach content of each bird was weighed and recorded. The stomach contents were then preserved separately in 95 % alcohol. **(Abigail *et al.*, 2013)**

In the laboratory, stomach contents were rated individually under a binocular magnifying glass, to identify and quantify the organisms at different levels of taxonomic resolution. The number of each food item in each category of food was represented as a percentage of the total number of items represented in all the food categories. Weight of food items in each category was expressed as a percentage of total weight of the food. Volume measured by water column displacement when all items from a single food category are introduced into a test tube to evaluate the effect of the bird in the environment of the agriculture, **(Ducommun *et al.*, 2008).**

The contribution of each prey item to the diet of the species was established by applying the index of relative importance **(IRI; Pinkas *et al.*, 1971):**

$$\mathbf{IRI = FO\% (N\% + V\%)}$$

Where **FO%** is the percentage frequency of occurrence of a particular category of food, **N%** is the percentage numerical and **V%** the percentage by volume.

Frequency of occurrence used the formula below **(Bowen, 1983)**

$$\mathbf{Fi = 100\ ni / n}$$

Fi: frequency of occurrence of the i food item in the sample;
ni: number of stomachs in which the i item is found;
n: total number of stomachs with food in sample.

Biodiversity Equations

The type of diversity used here is α diversity which is the diversity of species within a community or habitat. The diversity index was calculated by using the **Shannon and Wiener diversity index (1949).**

$$\text{Diversity index } \mathbf{H} = -\sum \mathbf{pi\ ln\ pi}$$

Where **Pi** = S/N
S = numbers of individual of one species.
N = total number of all individuals in the sample.
In = logarithm to base e.

Simpson's Index of Diversity D

It measures the probability that two individuals randomly selected from a sample will belong to the same species **(Simpson, 1949)**. It has been measured by the given formula:

$$\mathbf{D = 1-\{\sum n\ (n-1)/N\ (N-1)\}}$$

Where **n** is the numbers of individual of one species.

Measurement of species richness

Margalef's index was used as a simple measure of species richness **Margalef, 1958).** This richness index standardizes the number of species present against the total number of individuals present in the gut, **(Abigail *et al.*, 2013).**

$$\mathbf{Margelef's\ index\ d = (S\text{-}1)\ /\ ln\ N}$$

Where **S** is the number of species

Measurement of evenness

For calculating the evenness of species, the Pielou's Evenness Index (e) was used **(Pielou, 1966)**.

$$\mathbf{e = H\ /\ In\ S}$$

H = Shannon and Wiener diversity index

RESULTS AND DISCUSSION

All the stomachs analyzed (n = 16) contained food and recorded 33 taxa. Their quantification and frequency of occurrence are described and details in (Table 1).

Data in Table (1) and Fig. (1, 2, 3) showed that, class insecta constituted the main food in terms of number (83.9%), (62.62gm) and (47.92mm) Among insects the highest number of prey were *Tropinota squalidae* (250) belonged to order Coleoptera and *Liogryllus bimaculatus* (75) belonged to order Orthoptera, the lowest number of prey was *Mantis religiosa* (1) belonged to order Dictyoptera. For weight and volume

the highest value of prey were *Gryllotalpa gryllotalpa* (31.83gm and 201mm) belonged to order orthoptera and *Troppinota squalidae* (17.24gm and 199.75mm) belonged to order coleoptera, the lowest value of prey were *Vespa orientalis* and *Polistes gallica* (0.07gm and 0.25mm). Class Oligochaeta is represented by one species *Allolobophora caliginosa* (7.0) of number%. For weight% and volume% (4.07 and 2.85). Class Arachnida including one species *Paradosa* sp. (4.9%, 1.07%, and 0.89%). Class Chilopoda included one species *Scolopendra* sp. (1.1%, 0.09%, and 0.067%). Class Malacostraca included one species *Oniscus asellus* (0.1%, 0.11%, and 0.089%). Class Mammelia included one species *Arvicanthus niloticus* (0.1%, 2.48% and 2.23%). Class Amphibia constituted the secondary food category including one species *Bupho regularis* (2.9%, 29.56% and 45.95%) for number, weight and volume respectively.

Current results indicate that insects represented the main food item in the stomach of Cattle egret, which are coming along with those of **(Grzegors 1999, Sharah *et al.* 2008** and **Mwansat *et al.* 2015).**

The importance of food category is taken to means the amount (number) and bulk (volume or weight) in the diet. By considering both bulk and amount in association a more accurate view of dietary importance may be gained.

In this sense, we could say that this differentiation in diets of these species could be considered as a mechanism for allowing their coexistence.

Dipterans have been reported to be a second dominant food item in the gut of Cattle egrets. **(Telfair 1981).**

Our results disagree with **Kuranchie *et al.* (2013)** who recorded about 36% of amphibians by weight, as also reported by other studies. Amphibians are commonly found in both aquatic and terrestrial foraging Cattle egrets.

Mugica *et al.* (2005) reported that the fishes, crickets and other insects were the most important items all over the year of order Ciconiiformes.

The application of the index of relative importance (IRI) Fig. (4) yielded the following values: insects = 4,2% most important component in quantity and frequency of occurrence followed by Oligochaeta = 177.30%, Arachnida = 115.80%, Chilopoda = 4.67%, Malacostraca = 0.38%, Mammelia = 4.66% and Amphibia = 1,074.70%.

Our results agree with **Ducommun *et al.* (2008)** who cleared that the trophic spectrum of Cattle egret was made up of 17 taxonomic entities, mainly insects (IRI=15,000), among which Orthopterans were the most numerous followed by spiders and amphibians (IRI=250).

On the Other hand, **Quirogal *et al.* (2013)** reported that the trophic spectrum of *Nycticorax nycticorax* was made up of 16 taxonomic entities, mainly fishes (IRI= 9.100), followed by insects (IRI= 1.650), and crustaceans (IRI= 600).

Biodiversity Equations:

Shannon-Weiner Diversity Index (H') was 2.83, whereas Simpson's Diversity Index (D) was 0.91, species richness Margelef's d was 4.63 and species evenness was 0.81.

Our results agree with **Bibi and Ali (2013) & Kuranchie *et al.* (2013)** who found that, Cattle egrets at the grassy habitat exhibited the highest dietary diversity (H' = 1.62), dominance (0.71) and species richness (d=2.27) while those at the landfill site recorded the highest evenness (j'= 0.99). Cattle egrets at the silted drain recorded the

least species evenness (j'= 0.53). **Abigail *et al.* (2013)** revealed that, Cattle egrets at the grassy habitat recorded the highest dietary diversity (H' = 0.62). With regard to the type and amount of prey consumed by Cattle egrets at the landfill sites and silted drain, these serves as major biological agents in the ecosystem.

Table (1): Prey type's taxa and number, weight, volume and frequency of occurrence of species collected from stomach content of the Cattle egret at Gharbia Governorate

Taxonomy	Prey criteria			
	N.	W. (gm)	V. (mm)	FO
Insecta				
Coleoptera				
Elatridae				
Rypnus notodonta	20	0.48	5	4
Coccinelidae				
Coccinella chrysomelina	30	0.92	5.65	4
Cryptolaemus montrouzieri	67	0.55	3.45	8
Scymnus punctillum	31	0.313	1.25	5
Rodalia cardinalis	29	0.23	2.25	3
Scarabidae				
Tropinota squalidae	250	17.24	199.75	8
Pentodon bispinosus	37	3.05	17.4	4
Orthoptera				
Gryllidae				
Liogryllus bimaculatus	75	6.51	28.25	9
Gryllus domesticus	49	4.42	26	10
Gryllotalpidae				
Gryllotalpa gryllotalpa	25	31.83	201	9
Acrididae				
Eyrepocnemis plorans	12	1.17	4.75	4
Ailopus strepens	31	3.07	9.1	4
Diptera				
Taphiritidae				
Ducus ciliatus	18	0.19	1	1
Tachinidae				
Tachina larvarum	5	0.09001	0.25	2
Sarcophagidae				
Sarcophaga carnaria	49	1.39	11	3
Hymenoptera				
Vespidae				
Vespa orientalis	2	0.07	0.25	1
Polistes gallica	2	0.07	0.25	1
Formicidae				
Cataglyphus bicolor	24	1.6	12	2
Cephidae				
Cephus pygmaeus	3	0.08	0.25	1
Dermoptera				
Labiduridae				

Labidura riparia	33	0.72	3.25	3
Labidura minor	28	0.22	1	3
Hemiptera				
Pentatomidae				
Nezara virdula	3	0.23	0.75	2
Neuroptera				
Chrysopidae				
Crysopa pallens	3	0.15	0.75	2
Lipidoptera				
Noctuidae				
Agrotis ipsilon	2	0.12	0.5	1
Dictyoptera				
Mantidae				
Mantis religiosa	1	0.11	1	1
Odonata				
Coenagrionidae				
Ischnura senegalensis	5	0.09	0.25	1
Aeshnidae				
Hemianax ephippiger	2	0.09	0.25	2
Oligochaeta				
Opisthopora				
Lumbricidae				
Allolobophora caliginosa	70	4.88	31.95	9
Arachnida				
Aranae				
Lycosidae				
Paradosa **sp.**	49	1.28	10	10
Chilopoda				
Scolopendromopha				
Scolopendridae				
Scolopendra **sp.**	11	0.11	0.75	2
Malacostraca				
Isopoda				
Oniscidae				
Oniscus asellus	1	0.13	1	1
Mammelia				
Rodentia				
Muridae				
Arvicanthus niloticus	1	2.97	25	1
Amphibia				
Anura				
Bufonidae				
Bupho regularis	29	35.41	514.5	11

N = number of prey species W= weight of prey species V= volume of prey species
FO= frequency of occurrence

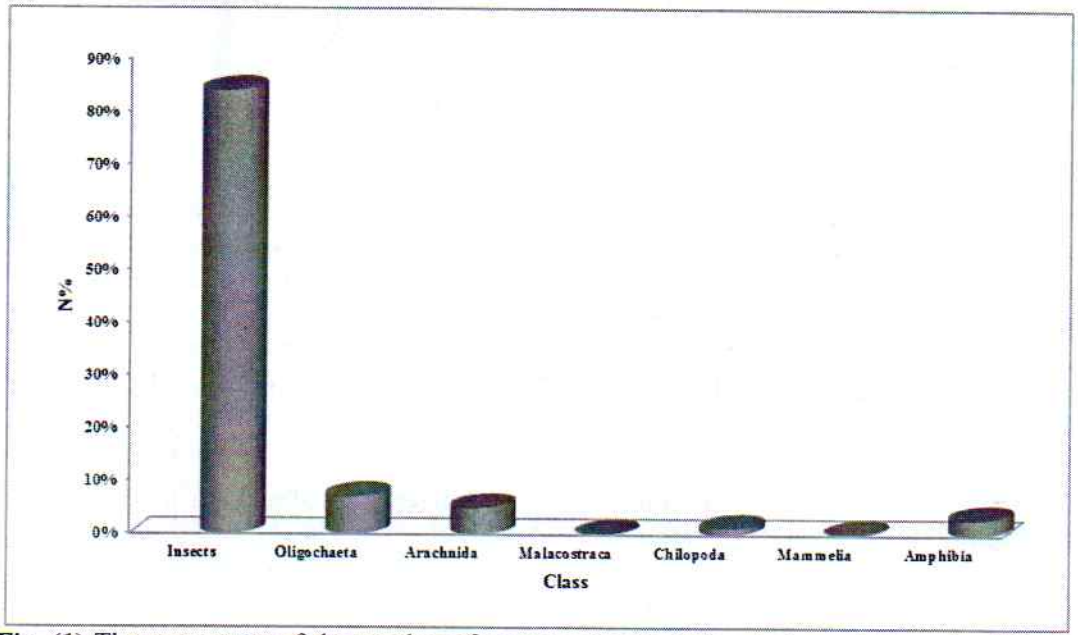

Fig. (1) The percentage of the number of prey species in different class of stomach of Cattle egret

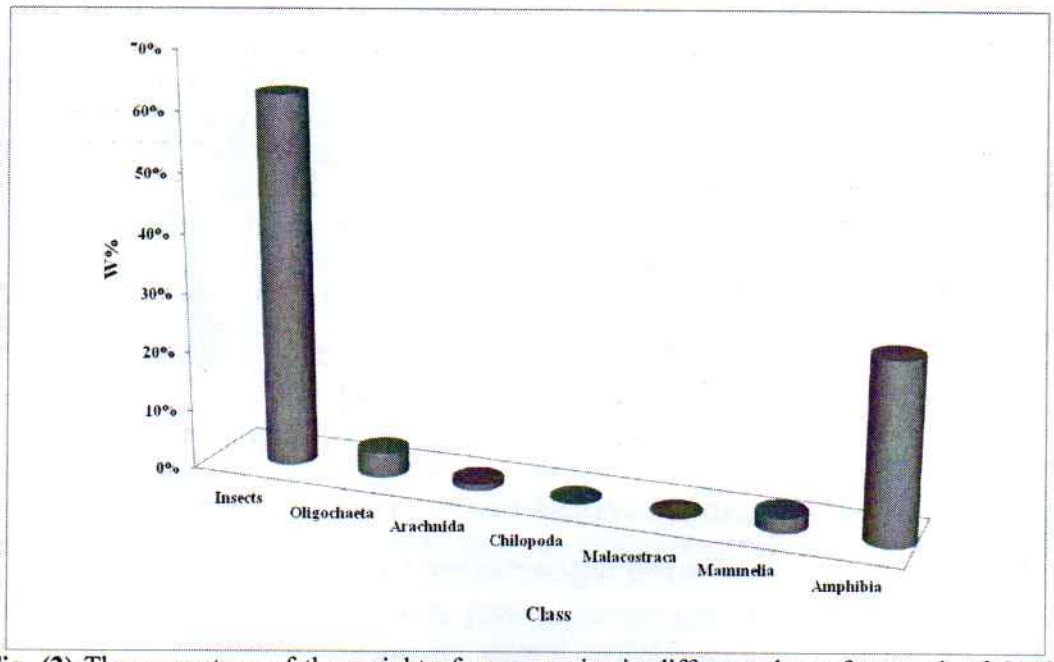

Fig. (2) The percentage of the weight of prey species in different class of stomach of Cattle egret

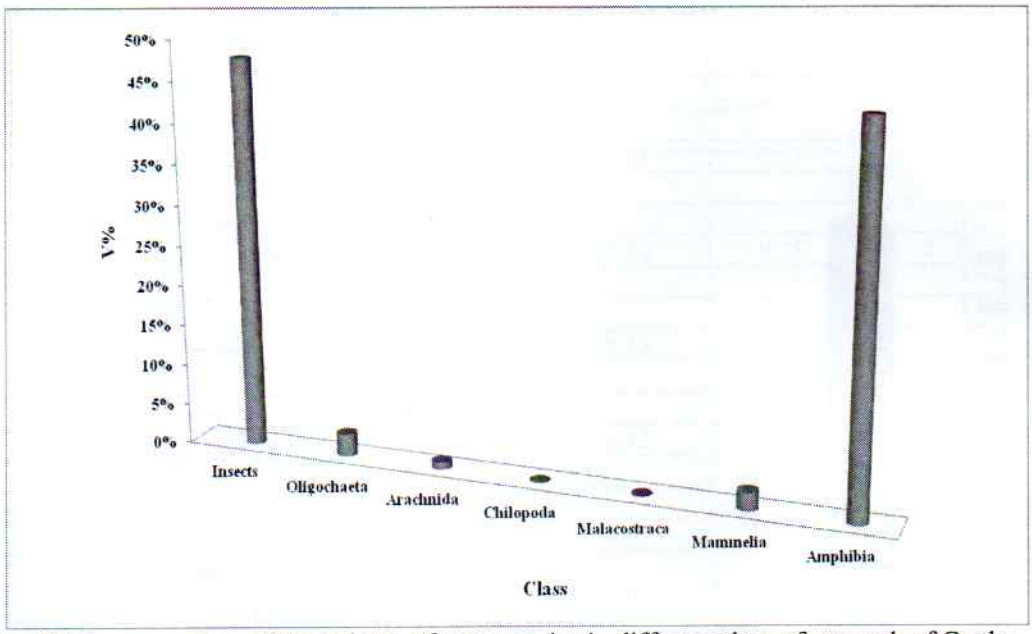

Fig. (3) The percentage of the volume of prey species in different class of stomach of Cattle egret

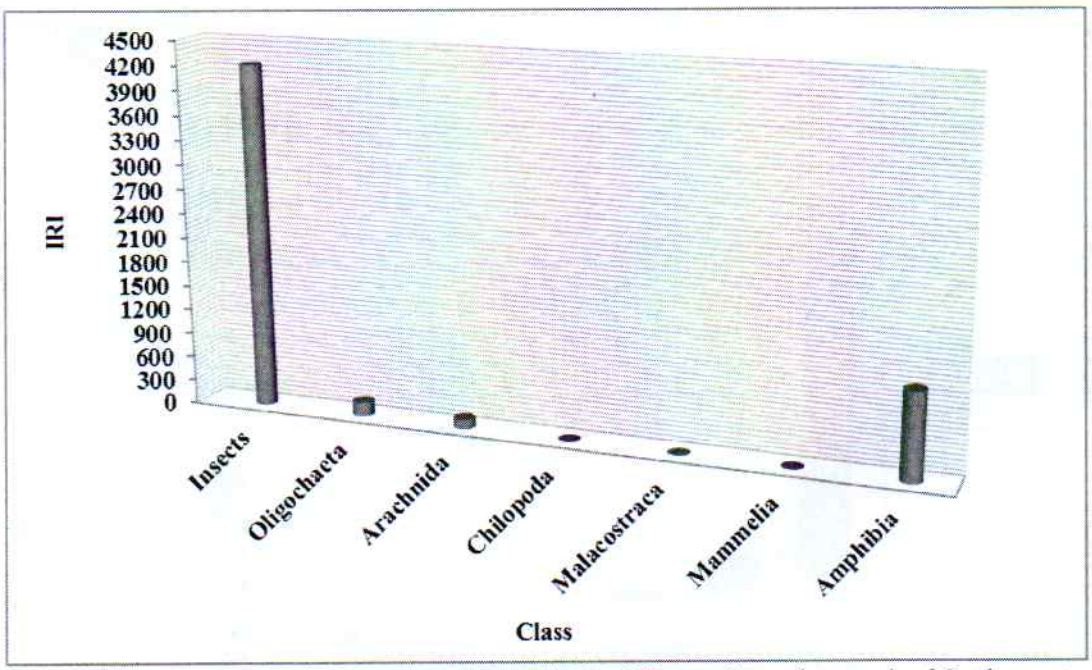

Fig. (4) The relative important of the prey species in different class of stomach of Cattle egret.

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الملخص العربي

نوع غذاء طائر أبو قردان في مركز طنطا - محافظة الغربية خلال عام ٢٠١٥

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تهدف هذه الدراسة إلى معرفة نوع غذاء طائر أبو قردان ودلائل التنوع لهذا الغذاء في مركز طنطا - محافظة الغربية خلال عام ٢٠١٥ م . تم استخدام ١٦ طائر عن طريق التصويب العشوائى٠ العينات تم تشريحها والمحتوى المعدى تم وزن وعد ما به. وقد أظهرت النتائج أن نوع غذاء الطائر يتكون من 33 نوع يتبع 25 عائلة ينتمى لها 16 رتبة تابعة إلى سبع صفوف. حيث يمثل صف الحشرات الغذاء الرئيسي لطائر أبو قردان حيث تعتبر الحشرات هى المكون الغذائي الأعلى قيمة من حيث العدد والوزن والحجم (٨٣.٩), (٦٢.٦٢), (47.92)., بينما يعتبر صف شفويات الأرجل المكون الغذائي الأقل قيمة من حيث العدد والوزن والحجم. ومن حيث الأهمية النسبية سجل صف الحشرات أعلى قيمة (٤, ٢٨.٢٤%) بينما سجل صف القشريات المكون الأقل أهمية (0.38%). وبالنسبة لدلائل التنوع سجل معامل شانون للتنوع ٢.٨٣ بينما سجل دليل سيمبسون ٠.٩١ وسجل دليل الغنى ٤.٦٣ ودليل التكافؤ ٠.٨١.