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Population fluctuations and biological aspects of hooded crow (*Corvus corone sardonius*) at Qalyubia Governorate

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Abstract
The goal of current study is to clarify every day habits and population fluctuations of the domestic crow, *Corvus corone sardonius* society at Qalyubia Governorate, Egypt. Field experiment was conducted to study some ecological aspects associated with major corvids to obtain the basic information needed to establish integrated bird management. The house crow has a problem species in both domestic and foreign countries due to their diversity methods of adaptation and economic damage. The results showed a significant difference in the everyday activity of the hooded crow depends on the variations of nature environments. Results generally revealed the largest population number during the summer and spring seasons, followed by winter, and the smallest number in the fall during 2022-2023 and 20232024 seasons. On the other hand, data cleared that hooded crow (*Corvus corone sardonius*) typically laid one clutches during its breeding season, the breeding season spanned from January to April, and count of clutches recorded the highest population in March. While, the lowest population recorded in January, February and April. Most of the clutches contained 3–4 eggs, (The. mean count of eggs / Clutch from 3.5 to 4.5 eggs in average).

Keywords: Hooded crow, population fluctuation, daily activities, damage, biology

Introduction
House crow, scientifically known as *Corvus splendens* considers one of the most prevalent and adaptable members of the Corvidae family (Passeriformes, Aves), Monirul & Midzhanur,2017 [28]. and Behrouzi-rad, 2010 [6]. Some bird species are closely associated with human and his activities; also, somewhat, dependent on him. In its simplest form, this association may merely consist of using man-made structures for perching, roosting or even nesting. At the other extreme, they might take advantage of our crops as a food source. Birds damage to the fields crops, particularly cereal grains that is a serious problem all over the world. In many African nations, the impact of birds on cereal crops becomes a pressing issue. Whit losses soaring to an alarming 5-10% of total production (El-Kiel, 1967). Crows are omnivores using a variety of food sources. In regions where they nest near waterfowl, crows can cause high harm to eggs and nestlings of other species. However, the consumption of nestlings and eggs a very small fraction of the crow's yearly diet, being less than one-third of one percent. The bulk of the diet is vegetable. Crows can cause damage to corn crops by opening the cobs, exposing them to weather damage. They also consume stored crops and sprouted seeds. In areas were there is no corn, crows may eat wheat or other grains (Robersonand Tenney,1993) [35]. Furthermore, birds may play a role in spreading the causative agents of plant diseases, including viruses, fungi, bacteria, and other parasites. They may also responsible for the spread of some communicable diseases between human and animals. On the other side, they may be considered as natural enemies to harmful insects when they feed on these pests in considerable amounts. Some previous studies have been conducted on the house crow, both from the agricultural view and attacking crops (Khattab *et al*., 2002) [21, 22]. used as a bio-agentto reduce the number of some types of rodents and insects **(**Kamel, 2014 [20], Issa, 2019 [19], Shivambu *et al*, 2020 and Ndimuligo *et al*., 2022) [32, 37]. In addition to some studies on the biology of the house crow (Ali, 2008 and Ranjan & Kushwaha, 2013) [2, 34], and its transmission to many micropathogens to humans and their domesticated animals (Nyari *et al*., 2006 and Fadel & Afifi, 2017) [14, 33]. In Egypt, the hooded crow was common resident across various habitats, including the cultivated areas of the Nile Delta and Valley. Known as an omnivorous bird and a constant scavenger (Mullié & Meininger, 1985; Goodman *et al*., 1989 [15], Cocker and Mabey,2005 [8], EL-Danasory, 2006). The hooded crow shows notable variations throughout the year, with higher abundance and wider distribution observed during the breeding season (Bonnah, 2007; Khattab, 2002) [7, 21, 22]**.** These studies indicated the diversity and difference in the distribution of crows, the nature of their environments and the type of their daily activity according to prevailing human activities (Archer, 2001 and Alias & Hashim, 2016) [3, 4]. This work aimed to **shed** light upon the population fluctuations, every day activities, clutch size and incubation period of hooded crow at Qalyubia governorate in Egypt.

Materials and Methods
1. Crow descriptive
The hooded crow, **(***Corvus corone sardonius*an) Ashley grey bird with black head, throat, wings, tail and thigh feathers, as well as a black bill, eyes and feet. Known for it is omnivorous, and is a constant scavenger.

2. Population Fluctuations and Every Day Activities
The monthly variations in the population and daily activities of the hooded crow, *C.*
sardonius, at three different habitats were observed from June 2022 to May 2024 during sunrise and sunset periods in three district districts (Ezbet Abdel Majeed Amer, ZawiatBiltan, and Banha) at Qalyubia governorate to determine the distribution of these birds across different seasons of the year. The bird activity was expressed by counting the investigated individuals for one hour during different intervals i.e at sunrise and at sunset using

the field glass binocular, in the three previously mentioned districts**.**

3. Bological Aspects

A biological study was conducted on the masked crow under field conditions at Qalyubia Governorate during 2023 year. Some nests were examined on trees. Known nests counts were used to determine clutch size, incubation period, hatchability, fledging period, and survival rates. Clutch size refers to the total number of eggs laid in a single nest. The incubation period was defined as the duration between the laying of the last egg and hatching, as described by Swanberg (1959) [39]. Hatchability was calculated as the ratio of hatchlings to the total number of eggs laid (Zduniak & Kuczyoski, 2003) [41]. The fledging period was defined as the time span from the hatching of the first egg to when the bird developed true feathers and was capable of leaving the nest. The number of fledglings defined as the count of nestlings present in the nest during the final observation visit (Kosicki, 2011) [24]. Breeding success was interpreted as the likelihood of raising at least one fledgling. The proportion of survival was defined as the number of fledged birds in relation to the total number of hatched eggs.

$$\% \textbf{ hatching } = \frac{\textbf{Total no. of egg hatching}}{\textbf{Total no. of egge}} \text{ x } 100$$

$$\% \textbf{ survival } = \frac{\textbf{No. of bird fledging}}{\textbf{Total no. of egge hatching}} \textbf{ x } 100$$

4. Damage Assessment of Corvid Birds In maize

A bird damage assessment was carried out in maize fields during summer 2023 after silking stage till the harvest. In this regard, two faddans cultivated with maize plants were selected in Ezbet Abdel Majeed Amer, Alqanatir Alkhayrih district, Qalyubia goverenorate.

Plants were inspected immediately after pollination, where the ears start filling. The field was divided randomly into 20 subplots (approximately 200m^2 each). Twenty successive plants were inspected in each plot to appreciation the degree of damage in the investigated ears (El-Deeb, 1991) [12]. Samples were taken weekly and the degree of harm due to bird species in the ears was estimated according to Hamelink (1981) [17]. by using the following equation:

$$\textbf{\% Damage intensity} = \frac{i_1 \times S_1 + i_{11} \times S_2 + \ldots\ldots\ldots\ldots i_v \times S}{N} \times 100$$

In which i = Damage. incidence expressed by the number of damaged ears per severity class.

($_1$= 0; $_{11}$ = 25 %; $_{111}$ = 50 %; $_{1v}$ = 75 %; $_v$ = 100 % grain missing).

S= Damage. severity for each class

I= 1, 2, 3, et c.

N= Total number of sampled.

5. Statistical analysis

The primary effects were assessed through an analysis of variance (ANOVA) for various treatments. The significance of these treatments was further analyzed using Duncan's multiple range tests ($P<0.05$) and the Student's t-test. All analyses were conducted using the software package "Costat," developed by Cohort Software Inc., Berkeley, California (Duncan, 1955) [9].

Results and Discussion

a. abundance fluctuations and daily activities

Results indicate that everyday activity of house crows based on variations in habitat varied throughout the period of investigation. Data indicated a substantial variation in house crow daily activity based on the differences in nature of the habitat. Data represented in Table (1) revealed that everyday activity recorded the highest population during the sunset time in village border and cultivated area (56.9 & 48.5) and (66 & 60.1) with a monthly average for the period from June to December for the years 2022-2023 and 2023-2024 respectively. Results associated to semi-annual average for the period from June 2022 to December 2023 were significantly decreased from the general Table)1(as compared to an average for the same period during the second season (41.7 & 51.9), respectively. Moreover, results summarize in table (1) describe that everyday activity recorded the highest number of residents during the sunset time of the village Border and the cultivated area, on a monthly basis. An increase in the number of Hooded Crow individuals during the month of August-2022(279 individuals) and July-2022 (266 individuals); while the number of Hooded Crow individuals decreased during the months of October& November -2022 to be 226 &217 individuals, respectively. As for individuals, compared to the same period during the month of June of 2023 to May 2024, a large number was recorded at the month of July followed by June 2023, with 349 & 339 individuals, respectively (table 1). While, a decrement in number of individuals was recorded at months of October and November reached to by 286 and 270 individuals. On the other hand, large numbers of individuals were recorded at near Border village, cultivated area and Village Center during the years 2023-2024, compared to 2022-2023. On the other hand, results in Table (2) indicated that Hooded Crow recorded (at spring, Summer, Autumn & winter seasons of 2022-2023) 398.5,403.5,351.5 & 374 individuals, respectively; whereas, the values were 473, 516,433.5 &421 individuals were found 2023-2024, respectively. Large differences in the seasonal activity of the crows was based on differences in the nature of habitat was investigated. Data shown in Table)2) and graphically illustrated in Figs. (1,2), reveal the seasonal activity which recorded the major population number during the summer and spring seasons, followed by winter, and the smallest number was in the fall during 2022-2023, while the largest population number was observed during the summer and spring seasons, followed by fall and the smallest number was in the winter during 2023-2024 seasons. Generally, the grand average which recorded during the second season was more than that observed during the first one. Also, Table (3) and Fig (3&4) prove that the total number of crows during the two seasons in relation to the sunset period is greater than the total number of crows during the sunrise period (Table 3). The data in Table (4) and Fig (5) also indicate that the number of birds in the tested habitats during the first season was less than the second season (1356). (495 &1204) and (1.558, 687& 1442) respectively.

These results are agreed with that published Behrouz-irad, (2010) and Attia, (2013) [5], Meininger *et al*., (1980) [27]. Furthermore, our findings align with those of Tan *et al*., (2020) [40]. and Hassan (2018) [18]. who mentioned that crows are often distributed with large numbers in the inhabited areas, public parks, hospital board and with a smaller number downtown. The results gained by Goodman *et al*. (1989) [15]. in harmony with the present observation. Aforementioned results cleared that hooded crow was found throught the different year seasons and their population densities were considerably fluctuated among there seasons under the study. These ecological aspects had been explained by Marshall and Combs (1958) [26], the authors mentioned that there were seasonal changes in the behavior, sexual cycle, moult and external of Rook Corvus frugilegus.

Another trend was observed by Sibley and Monroe (1990) [38]. they found that carrion and hooded crow sometimes form very large communal roots in the autumn & winter and can number fundreds or even thousands of birds, often with other crow species also being present. Crow are quite common birds in garden with late spring and early summer, the peak times for such observation. At the same time, the obtained results agree with finding of Gorenzel and Salmon (1995) [16], they mentioned that American crows Corvus brachyrhynchos roots in urban areas of USA and some Crows roosted in town all year with peak abundance from September to January.

Hooded crow was distribution in the different ecosystems was studied during the four-year seasons. On the other hand, village borders harbored had the highest number of this bird species khidr, 2009 [9], and Mostafa, *et al*. (2015) [29], they mentioned the highest density of crow bird (*Corvus corone cornix*) population was observed at sunrise during July and September in vegetables and crops fields, respectively. Whilst, at sun-set the largest population recorded during January & August in cultivated fields with vegetables and crops, respectively. Moreover, Saleh *et al*. (2022) [36]. found that highest numbers were recorded at the summer during the sunset period.

Table 1: Population Fluctuations of hooded crow bird, (*Corvus corone sardonius)* during two seasons (2022/2023 and 2023/2024) at Qalubia, Governorate.

Month	Population Fluctuations									Total	Mean
	Village Border (grass land)			Village Center			Cultivated area				
	S. R	S. S	D.AV	S. R	S. S	D.AV	S. R	S. S	D.AV		
Jun.2022	40	73	56.5	14	28	21	55	52	53.5	262	$43.7^{c} \pm 0.9$
Jul.	42	76	59	16	25	20.5	51	56	53.5	266	$44.3^{b} \pm 0.56$
Aug.	45	69	57	21	29	25	54	61	57.5	279	$46.5^{a} \pm 0.412$
Sep.	48	70	59	19	27	23	45	51	48	260	$43.3^{c} \pm 1.77$
Oct.	39	69	54	12	23	17.5	36	47	41.5	226	$37.67^{f} \pm 3.24$
Nov.	37	71	54	15	24	19.5	41	29	35	217	$36.17^{g} \pm 2.23$
Dec.	49	69	59	14	23	18.5	33	52	42.5	240	$40^{d} \pm 0.56$
Total	300	497	398.5	111	179	145	315	348	331.5	1750	291.67
Mean	42.9	71	56.9	15.9	25.6	20.7	45	49.7	48.5	250	41.7
F. value											0.0000^{***}
L.S. D											0.0532
Jan.2023	39	72	55.5	13	28	20.5	50	44	47	246	$41^{c} \pm 1.77$
Feb.	45	75	60	17	27	22	48	50	49	262	$43.7^{b} \pm 0.59$
Mar.	42	62	52	16	26	21	52	61	56.5	259	$43.16^{b} \pm 2.65$
Apr.	45	68	56.5	20	19	19.5	53	69	61	274	$45.66^{a} \pm 1.71$
May.	46	65	55.5	19	20	19.5	52	62	57	264	$44^{b} \pm 2.94$
Total	217	342	279.5	85	120	102.5	255	286	270.5	1305	217.52
Mean	43.4	68.4	55.9	17	24	20.5	51	57.2	54.1	261	43.5
F. value											0.0004^{***}
L.S. D											1.3827
Jun.2023	51	84	67.5	23	39	31	64	78	71	339	$56.5^{c} \pm 4.12$
Jul.	53	88	70.5	27	36	31.5	60	85	72.5	349	$58.17^{a} \pm 3.35$
Aug.	54	90	72	30	38	34	63	69	66	344	$57.33^{b} \pm 2.69$
Sep.	57	77	67	28	34	31	54	61	57.5	311	$51.83^{d} \pm 2.06$
Oct.	45	74	59.5	23	32	27.5	50	62	56	286	$47.67^{e} \pm 3.53$
Nov.	46	73	59.5	21	31	26	44	55	49.5	270	$45^{g} \pm 3.24$
Dec.	56	76	66	20	33	26.5	38	59	48.5	282	$47^{f} \pm 1.18$
Total	362	562	462	172	243	207.5	373	469	421	2181	363.48
Mean	51.7	80.3	66	24.6	34.7	29.6	53.3	67	60.1	311.6	51.9
F. value											0.0000^{***}
L.S. D											0.0382
Jan.2024	48	69	58.5	18	32	25	48	53	55.5	268	$44.67^{e} \pm 2.25$
Feb.	53	66	59.5	25	33	29	55	60	57.5	292	$48.67^{d} \pm 1.47$
Mar.	51	78	64.5	24	34	29	58	67	62.5	312	$52^{c} \pm 2.65$
Apr.	54	78	66	27	28	27.5	56	73	64.5	316	$52.7^{b} \pm 2.35$
May.	55	82	68.5	25	26	25.5	59	71	65	318	$53^{a} \pm 0.29$
Total	261	373	317	119	153	136	276	324	305	1506	251.04
Mean	52.2	74.6	63.4	23.8	30.6	27.2	55.2	64.8	61	301.2	50.208
F. value											0.0000^{***}
L.S. D											0.0044

S.R.= sun-rise time, S.S. = sun-set time. D. Av. = Daily Average count
Village Border = Number of birds in area of 2 fed. (grass land)
Village Center= Number of birds in around 10 building. Village Center High-riseor Low-rise ≤1 surface storey, government housing, condominiums, residential buildings or communal buildings, Cultivated area =Number of birds in Cultivated areas of 2 fed.

Table 2: Distribution of hooded crow bird, *Corvus corone sardonius* during two seasons (2022/2023 and 2023/2024) at Qalubia Governorate.

Season	Village Border	Village Center	Cultivated area	Total no. of birds	Mean
2022/2023 Spring	164	60	174.5	398.5	132.83± 7.23
Summer	172.5	66.5	164.5	403.5	134.5 ± 2.45
Autumn	167	60	124.5	351.5	117.17 ± 2.09
Winter	174.5	61	138.5	374	124.67 ± 2.39
Total	678	247.5	612	1537.5	
F. value					0.9814^{ns}
L.S. D					110.42
2023/2024 Spring	199	82	192	473	131± 3.03
Summer	210	96.5	209.5	516	172 ± 1.14
Autumn	186	84.5	163	433.5	177.83 ± 3.57
Winter	184	80.5	156.5	421	140.37 ± 2.21
Total	779	343.5	721	1843.5	
F. value					0.8173^{ns}
L.S. D					135.117

Village Border = Number of birds in area of 2 fed. (grass land)
Village Center= Number of birds in around 10 building. Village Center High-riseor Low-rise ≤1 surface storey, government housing, condominiums, residential buildings or communal buildings, Cultivated area =Number of
birds in Cultivated areas of 2 fed

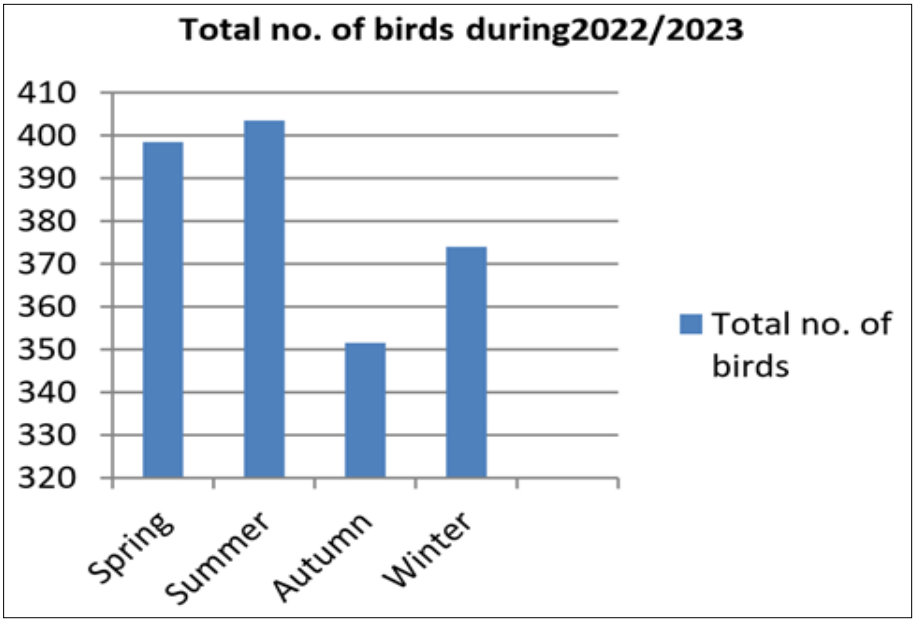

Fig 1: Distribution of hooded crow *Corvus corone sardonius* during 2022/2023 year at Qalubia Governorate.

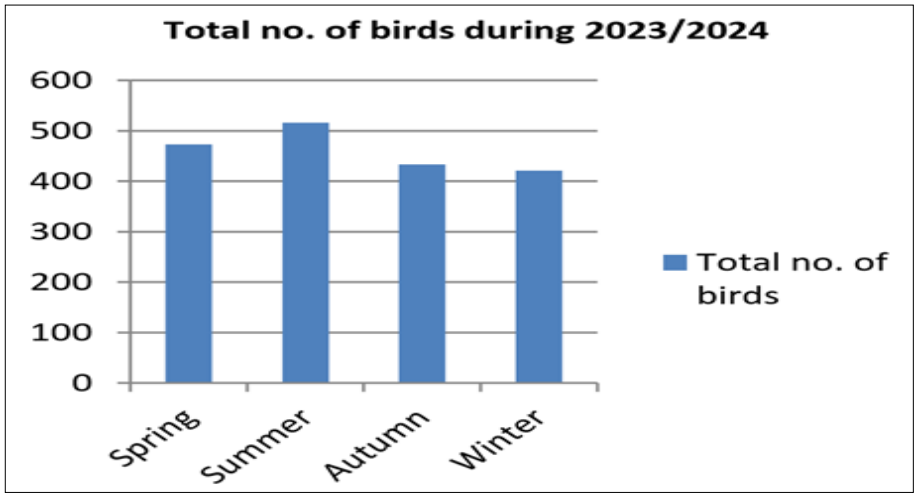

Fig 2: Distribution of hooded crow *Corvus corone sardonius* during 2023/2024 year at Qalubia Governorate.

Table 3: Population Fluctuations of hooded crow, *Corvus corone sardonius* during two seasons (2022/2023 and 2023/2024) at Qalubia Governorate

Month	Hbitats (2022-2023)			Hbitats (2023-2024)			Total	Mean
	Village Border	Village Center	Cultivated area	Village Border	Village Center	Cultivated area		
	S. R	S. R	S. R	S. R	S. R	S. R		
Jun.	40	14	55	51	23	64	247	41.167^{f}± 1.23
Jul.	42	16	51	53	27	60	249	41.5^{e}± 1.18
Aug.	45	21	54	54	30	63	267	44.5^{a}± 0.59
Sep.	48	19	45	57	28	54	251	41.83^{d}± 1.48
Oct.	39	12	36	46	21	44	198	33^{k}± 1.18
Nov.	37	15	41	45	23	50	211	35.17^{i}± 2.56
Dec.	49	14	33	56	20	38	210	35^{j}± 2.12
Jan.	39	13	50	48	18	48	216	36^{h}± 0.68
Feb.	45	17	48	53	25	55	243	40.5^{g}± 2.12
Mar.	42	16	52	51	24	58	243	40.5^{g}± 2.23
Apr.	45	20	53	54	27	56	255	42.5^{c}± 0.89
May.	46	19	52	55	25	59	256	42.67^{b}± 2.07
Total	517	196	570	623	291	649	2846	
F. value								0.0000^{***}
L.S. D								5.158
	S. S	S. S	S. S	S. S	S. S	S. S		
Jun.	73	28	52	84	39	78	354	59^{c}± 2.96
Jul.	76	25	56	88	36	85	366	61^{a}± 0.89
Aug.	69	29	61	90	38	69	356	59.33^{b}± 2.56
Sep.	70	27	51	77	34	61	320	53.33^{g}± 2.96
Oct.	69	23	47	73	31	55	298	49.67^{j}± 2.21
Nov.	71	24	29	74	32	62	292	48.67^{k}± 2.12
Dec.	69	23	52	76	33	59	312	52^{h}± 2.23
Jan.	72	28	44	69	32	53	298	49.67^{j}± 1.97
Feb.	75	27	50	66	33	60	311	51.83^{i}± 1.65
Mar.	62	26	61	78	34	67	328	54.67^{f}± 2.27
Apr.	68	19	69	78	28	73	335	55.83^{d}± 2.52
May.	65	20	62	82	26	71	326	54.33^{e}± 1.48
Total	839	299	634	935	396	793	3896	
F. value								0.0000***
L.S. D								0.0843

S.R. = Sun-rise time, S.S. = Sun-set time. D.Av. = Daily Average count
Village Border = Number of birds in area of 2 fed. (grass land)
Village Center= Number of birds in around 10 building. Village Center High-riseor Low-rise ≤1 surface storey, government housing, condominiums, residential buildings or communal buildings, Cultivated area = Number of birds in Cultivated areas of 2 fed.

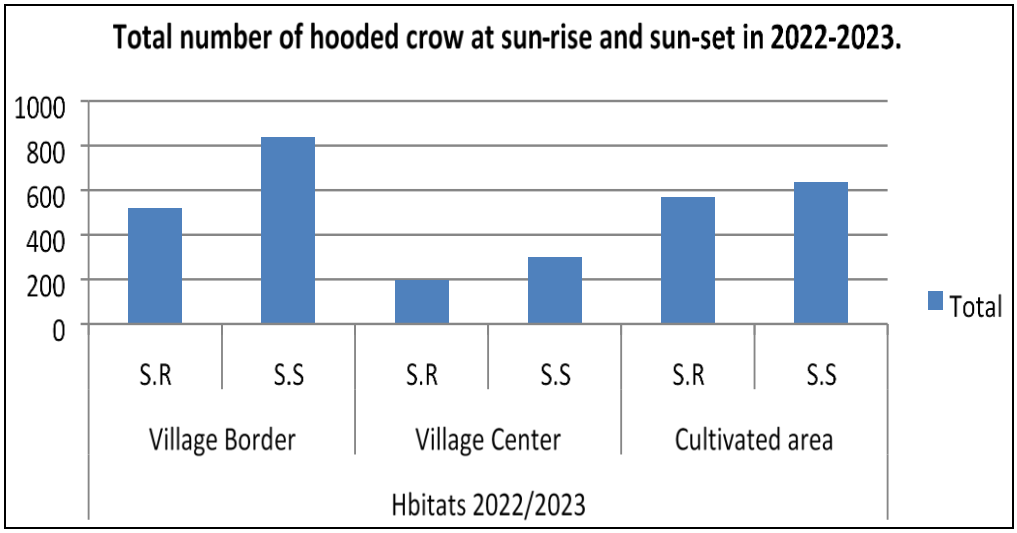

Fig 3: Population Fluctuations of hooded crow bird *Corvus corone sardonius* at Qalubia Governorates

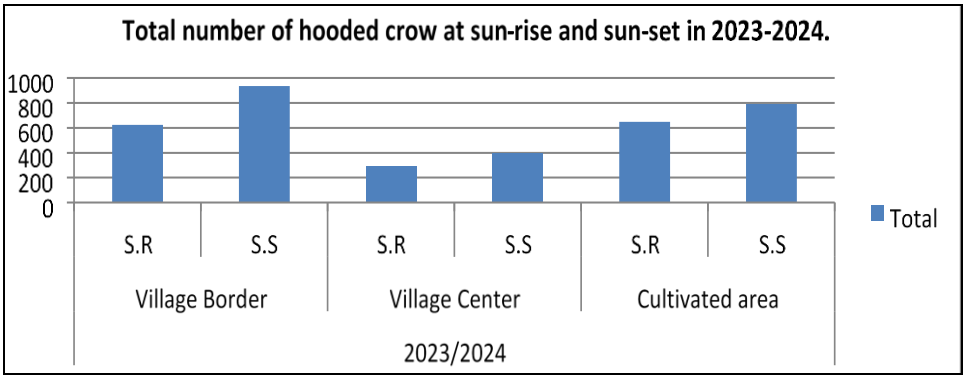

Table 4: population density of hooded crow bird, *Corvus corone sardonius* at Qalubia, Governorates during two seasons (2022/2023 and 2023/2024)

	Hbitats 2022/2023			Total	Hbitats 2023/2024			Total
Total number	Village Border	Village Center	Cultivated area		Village Border	Village Center	Cultivated area	
	1,356	495	1,204	3055	1,558	687	1,442	3687

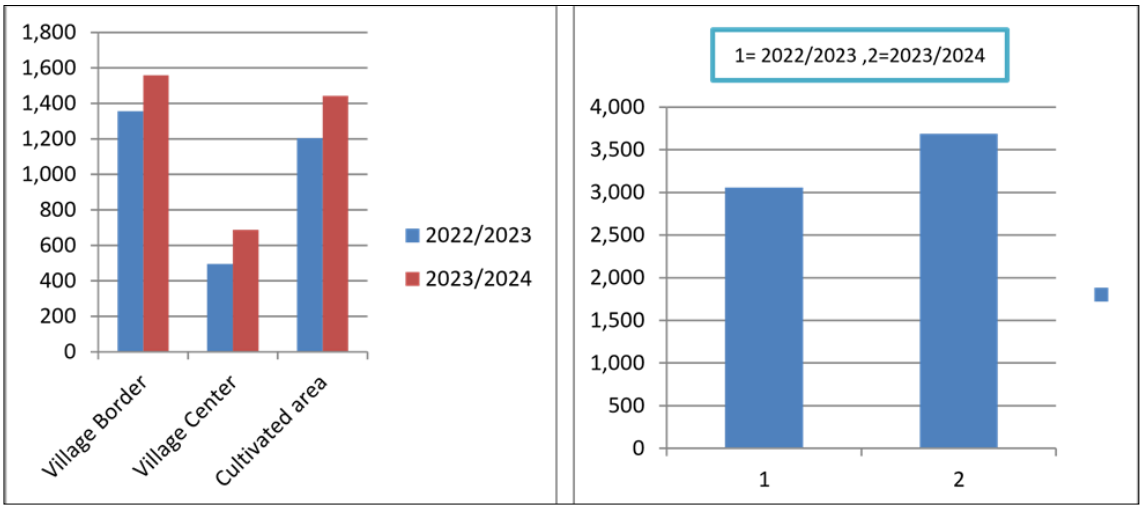

Fig 5: population density of hooded crow, *Corvus corone sardonius* at Qalubia, Governorate during two seasons (2022/2023 and 2023/2024).

b. Some biological and behavioral aspects of hooded crow *Corvus corone sardonius*

1. Number of clutches and eggs

Number of domestic crows increased in recent years. Regarding behavior, this bird is very social and bold. Its breeding season begins from January to April, where it builds its nests and then lays eggs. They build their nests high in trees away from human disturbance. All eggs produced by a bird often at one time placed in a bird's nest. Egg clutch size highly varies between species, and occasionally even within the same species sex. It may also vary within the same species due to much factors such as homeland, nutrition, health, time of year and predation pressures (Lack, 1947) [25].

All nests were found during this time and located while walking total of 10 trees that housed house crow. Each tree containing nest or nests numbered. Each nest was inspected two times a week during the whole breeding season. Trees were climbed with a ladder to check for presence of eggs occasions.

2. Characteristics of nest

The nest of the house crow is characterized by its construction using a variety of materials, mainly twigs and pieces of discarded metallic wires.; whereas other materials consisted of plastic items and plant components like grass, leaves, and rhizomes. The house crow nesting in high trees with a large crown in order to minimize human disturbance and for spotting food sources from a distance (Dutta, 2007) [10].

3. Clutch size

The average number of eggs in most clutches was 3.5 –4.5 eggs. Two of the clutches contained 3 eggs, one with 5 eggs and 7 with 4 eggs. Data, from egg laying up to fledging or failure, were obtained for 10 nests (Fig. 6).

Results in table (5), show that the breeding season started from January to April recording the highest count of clutches in March with 4 clutches. While, the lowest clutch population was recorded in January, February and April with 2 ones. The mean count of eggs / clutch differed from 4.5 to 3.5 eggs per clutch with average of 3.937 eggs/clutch.

The highest numbers of eggs laid were investigated in January and April with 4.5, 4 eggs/clutch, respectively. Whereas, the lowest ones were observed in February with 3.5 eggs per clutch**.**

The total numbers of investigated eggs were 39**.**

c. Incubation period

Incubation period of eggs is the time from the incubation start to hatching (regular un interrupted). Incubation period of crow differed according to temperature, the incubation period recorded 19, 18.5, 18.75- and 18.5-day during January, February, March and April respectively (Table 5) The average of incubation period for all inspected nest.

d. Hatchability

The highest clutch hatchability was observed in April at 87.5%, followed by January at 75% and February at 77.77%. The lowest hatchability occurred in March, at 66.7%. The overall hatchability recorded 75.84% (Table 5)**.**

e. Survival

The total survival rate was 79.76%. The highest population during March was 90%, while, the lowest in January (60%) (Table 5). The obtained results confirmed by Zduniak and Antczak (2003) [41], who stated that the average (mean) clutch size was 4.43 eggs. Also, Bonnah (2007) [7]. mentioned that most breeding season was found during spring comparison autumn months, the number of eggs per nest differed from 3.9 eggs per nest to 1.9 egg per nest. Addition, Mostafa *et al*. (2015) [29]. described that the breeding season of crow bird had been lasted from January to April. The average number of eggs / clutches differs from 3.25 to 5.5 eggs / clutch with average (mean) of 4.07 eggs per clutch. The total mean of incubation period was 18.57 days. Also, the same observations about nest locations, nest and egg characteristics were stated by Muhammad *et al*. (2015) [30]. during the 2013 breeding season (June to September). The mean clutch size was 4.0 egg showing 55.1 and 69.0% success. The main reasons for reproductive failures were poor nest construction, bad weather conditions, unhatched eggs.

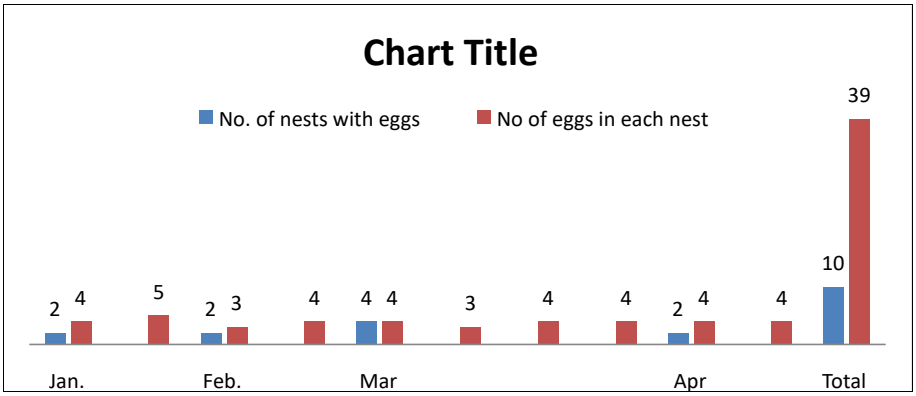

Fig 6: of eggs in each nest

Table 5: Some biological aspects of associated with hooded crow bird during 2023 at Qalyubia Governorate

Biological aspects		Months				Total
		Jan.	Feb.	Mar	Apr	
	No. of inspected nests	10	10	10	10	
	No. of nests with eggs	2	2	4	2	10
No of eggs	Total No of eggs	9	7	15	8	39
	Mean No of eggs	4.5	3.5	3.75	4	3.937
Hatching	Total no. of egg hatching	7	5	10	7	29
	Mean eggs	3.5	2.5	2.5	3.5	3
	% hatching	77.77	71.4	66.7	87.5	75.84
Incubation period	Total	38	37	75	37	187
	Mean	19	18.5	18.75	18.5	18.69
fledging period	No. of bird fledging	5	3	9	6	23
	Total days	68	67	129	61	325
	Mean days	34	33.5	32.25	30.5	32.56
% survival		71.428	60	90	85.71	79.76

Where:

$$\% \textbf{ hatching } = \frac{\textbf{Totalno. ofegghatching}}{\textbf{Total no. of egge}} \text{ x } \mathbf{100}$$

$$\% \textbf{ survival } = \frac{\textbf{No. of bird fledging}}{\textbf{Total no. of egge hatching}} \textbf{ x } \mathbf{100}$$

1. Damage percentages by hooded crow in Maize plants

Maize is among the favored food sources for the hooded crow. The birds feed on grains during the different growth stages (Khattab *el al*., 2002) [21, 22]. Data in table (.) revealed a high loss recorded (9.5) followed by (9) in 7th and 6th weeks, respectively; while, losses absent during 1st week. The means of damage percentage at different degrees of 25, 50, 75 and 100%, were 9, 8.214, 6.0357 and 1.857% recorded, respectively. On the other hand, the average percentage of damage showed a steady increase, rising from 3.56% in the second week to 9.5% by the seventh week. These results agree with Khattab *et al*., 2002 [21, 22]. reported that crow attack the maturing stage of Maize, the preferred time from 35 to 42 days after silking with lowest damage was recorded in ear without trimming and higher damage in

those with pruning. The percentage of hooded crow bird damage on Maize was studied by El-Danasoury, 2006 [11], who mentioned that the Maize fields of new reclaimed lands exposed severely to crow attacking than the old land at three location, fields near orchards trees, and buildings. Abbasy *el al*. (2012) [1]. mentioned that bird damage on Maize increased throughout the weeks after silking and during the development or grains growth till the sixth week, while the lowest value at the second week. Additionally, a highly significant difference was noted between the weeks.

Table 6: Damage percentages by crow bird in maize fields at Ezbet Abdel Majeed Amer, alqanatir alkhayrih district, Qalyubia Governorate during 2023 seasons

Week after pollination	Total No. of examined plants	Degree of damage				Mean
		25%	50%	75%	100%	
1st	400	0.0	0.0	0.00	0.00	0.0
2nd	400	7.25	5.25	1.75	0.0	3.56
3rd	400	8.5	8	6.00	0.75	5.813
4th	400	10.75	9.5	7.75	2.50	7.625
5th	400	11.25	11	8.75	2.75	8.438
6th	400	12.50	11.75	8.75	3.00	9
7th	400	12.75	12	9.25	4.00	9. 5
Mean		9	8.214	6.0357	1.857	6.277

% damage	Week after pollination							Mean
	1st	2nd	3rd	4th	5th	6th	7th	
	0.0	5.75	11.375	15 .75	17.6258	18.5625	20.125	12.705

Conclusion

The study provides some ecological and breeding biology aspects domestic crow, *Corvus corone sardonius* to obtain the basic information needed to establish integrated bird management at Qalyubia Governorate, Egypt. The results showed a significant difference in the everyday activity of the hooded crow depends on the variations of nature environments. Generally, results revealed the largest population number during the summer and spring seasons, followed by winter, and the smallest number in the fall during two study seasons. Also, results proved that the total number of crows during the two seasons in relation to the sunset period is greater than the total number of crows during the sunrise period. On the other hand, data cleared that hooded crow typically laid one clutches during its breeding season, the breeding season spanned from January to April, and count of clutches recorded the highest population in March. While, the lowest population recorded in January, February and April. The. mean count of eggs / Clutch from 3.5 to 4.5 eggs in average.

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