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Wild Bird Species Structure and Feeding Guilds in Agricultural Area at Zagazig District, Sharkia Governorate, Egypt

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ABSTRACT

Bird presence in the agricultural ecosystem is a critical for preserving ecological balance due to its various ecological impacts. The composition of bird species and their feeding guilds in agricultural land was investigated in El-Zahraa village, Zagazig district, Sharkia Governorate, Egypt. The point count method was used to survey bird species from April 2021 to March 2022. The survey identified a total of 21 bird species belonging to 17 families and 7 orders. The order Passeriformes was the most abundant; consist of 10 families: Alaudidae, Cisticolidae, Corvidae, Estrildidae, Hirundinidae, Motacillidae, Muscicapidae, Passeridae, Pycnonotidae, Sturnidae. The composition of bird guilds indicated that granivorous and insectivores birds were being more numerous than other guilds (omnivores, carnivores and piscivorous) while, the frugivorous birds was the least represented. The dominant bird species were represented with 5 species: house sparrow, hooded crow, rock pigeon, cattle egret and laughing dove. Food preference experiments conducted on the hooded crow revealed that birds tend to consume Tamia, liver, chicken intestine, and fish in that order. Interestingly, the crows did not consume any amount of crushed maize. Additionally, in terms of color preference, food placed on a blue plastic sheet was favored over food on a red plastic sheet. The abundance of bird species and the diversity of their feeding guilds reflect the richness of food resources in the agricultural area. Furthermore, understanding the food preferences of the hooded crow may assist in utilizing this preferred and cost-effective food (Tamia) as bait to attract and control these birds.

Keywords: Bird diversity; Ecological balance; El-Zahraa village Feeding guilds; Food preference; Granivorous; Hooded crow.

INTRODUCTION

Egypt is situated in North Africa (Eastern corner) and western Asia, it's a bridge between continental, it's holding wide range of habitats that host and home to many bird species (State Information Service, 2024). About 515 bird species are founded in Egypt, format about 4.70% out of world bird species, 186 of these species are resident, while the rest are migratory particularly Egypt is considered one of an important migration route for birds in the world (EEAA, 2016; Shaltout and El-Khalafy, 2024).

The environmental diversity in Egypt is an important tool for attracting many bird species that have settled and adapted to many places in Egyptian environment. As a result, bird species were recorded in the different Governorates; In Damietta Governorat Sheta *et al.* (2010) recorded 154 bird species represented by 40 families following 17 orders. In Ismailia Governorate, about 27 resident bird species and 6 migratory bird species occurred (Abbasy *et al.,* 2012). At Gharbia governorate the resident bird species were 24 while the migratory birds were 5 species (Metwally *et al.,* 2016). In Sharkia Governorate Issa (2019) recorded 25 bird species as resident and 8 as migratory, but he noticed that aquatic habitats harbor a higher number of birds than field crop habitat. The agriculture habitat in Giza Governorate was inhabited with 28 bird species belonging to 25 families and 9 orders (Rizk *et al.,* 2020). In Assiut Governorate Omar (2020) found that the bird species there were 23 species of birds follow 17 families and 9 orders. At Burllus Lake in northern Egypt, 49 bird species from 23 families belonging to 12 orders were founded (Sheta, 2019). In the same lake but in 2023, a total of 60 bird species were founded by Sheta *et al.* (2023) amongst, 40 bird species were recorded as migratory while the rest (20) were resident bird species, theses bird species follow to 23 families belonging to 12 orders. In Saint Catherine protectorate, South Sinai, Egypt Soliman *et al.* (2022) recorded 73 bird species belonging to 28 families and 12 orders.

The term guild refers to a group of species that accomplish an ecological role in accordance with its utilization of resources within a community (Ricklefs, 2010). The bird feeding guild is specified by a variety of food types consumed (Ghosh *et al.,* 2022). But the distribution and structures of bird feeding guilds According to the habitat type, the understanding is still limited (Wu et al., 2024). Therefore, studies on bird feeding guilds are essential for understanding the structure of bird species in specific areas (Shafie *et al*., 2023), as these guilds relate to the functional aspects that define how bird species interact within ecosystems (Pabico *et al*., 2020). Many studies have categorized species into guilds based on the food resources present in their diets, such as omnivores, piscivores, insectivores, carnivores, granivores, and frugivores (González-Salazar *et al*., 2014; Sohil and Sharma, 2020; Pangestu *et al*., 2023). In Egypt Omar (2020) founded that the bird feeding guilds at Assiut

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Governorate were Insectivorous, Carnivorous, Omnivorous, Granivorous and Piscivorous.

The hooded crow (*Corvus corone cornix* Linnaeus, 1758) is a passerine bird from the family Corvidae in the order Passeriformes (Svensson *et al*., 2009). It is a typical species found in rural agricultural areas, urban environments, and even in large cities (Emery and Clayton, 2004). The hooded crow is an omnivorous bird that feeds on a wide variety of invertebrate prey, including insects, mollusks, amphibians, fish, crayfish, as well as eggs and nestlings of other bird species. Its diet also includes agricultural crops (field crops, vegetable crops, and horticulture) and sheep farm products (Zduniak *et al*., 2008; Attia, 2013; Ahmed *et al*., 2018; Preininger *et al*., 2019). It's numerable as a serious pest problem for agriculture sector in Egypt because it attacks and depredates crops, vegetables and fruits during the different growing stage (Abbasy *et al*., 2012; Attia, 2013; Issa and El-Bakhshawngi 2018). As a result, it is causing a significant impact for growers, through yield losses, control costs and may lead to replanting the crops (Anderson *et al*., 2013; Elser *et al*., 2019; Issa *et al*., 2022).

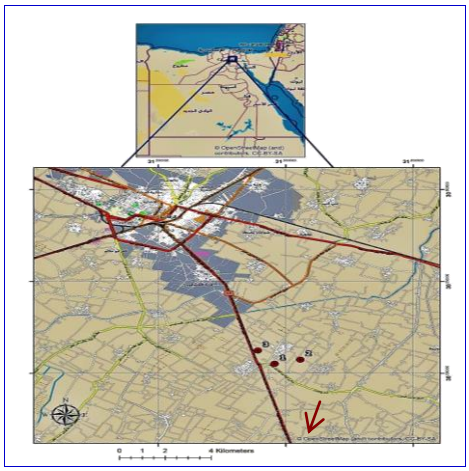
Birds are used color for specific behaviors; they can discriminate and choose between different colors (Kelber *et al*., 2003). Ditto many birds have a preference to specific, or disinclination to, food with different colors (Duan *et al*., 2014), but preference to specific food color may vary according to the food type (Teichmann *et al*., 2020). Frugivorous birds prefer red color over blue, green, black and yellow (Duan *et al*., 2014). But other studies refer to the fact that many birds prefer different colors, as example the garden birds preferred silver and green than red and yellow color (Rothery *et al*., 2017). In contrast, red and black fruits were preferred than other colors (Gagetti *et al*., 2016). The former expertise with the colors is another influence for color preference in omnivorous as it tends to utilize a wide range of natural and novel food resources (Mukhopadhyay and Mazumdar 2019) it depended on an individual age (Teichmann *et al*., 2020). Finally, we believe that the availability and abundance of food resources also influence food and color preferences.

Our objective was to survey wild bird species, bird populations, the most dominant birds, and bird feeding guilds, while also studying the food preferences of the hooded crow (in response to numerous complaints about this species). We tested the effect of feeder color on food intake under field conditions in Sharkia Governorate from April 2021 to March 2022, aiming to provide data that could aid in the control program for hooded crows.

MATERIALS AND METHODS

Data collection

Data were collected monthly from April 2021 to March 2022 in El-Zahraa village, an agricultural area located within the Zagazig district of Sharkia Governorate in East Egypt. The geographical coordinates of the study site are latitude 31.5202285° N, and longitude: 31.2327145° E30° 35' 15.65" (Map 1). Three sites were chosen as replicates, the minimum distance between each replicate was 1 km. The experimental trials were conducted in the early morning after sunrise directly in good weather condition, specifically with no wind or rain.



Map (1): Location of experimental sites in Al-Zaharaa village, sited within the Zagazig district of Sharkia Governorate in East Egypt.

Bird survey

Fixed raising position was chosen in each site (the three replicates), within a circle of 50 m radius for 10 min birds were surveyed in the early morning from 6 am to 8 am (Issa, 2019). Bird identifications were done using Collins Bird Guide (Svensson *et al.,* 2009), and bird taxonomy were achieved according to (Clements Checklist v2023).

The surveyed bird species were categorized to six feeding guild types (omnivore, carnivore, piscivorous, granivore frugivore, and insectivore) based on their preferred diet descriptions from the literature (González-Salazar *et al.,* 2014; Subasinghe and Sumanapala 2014; Imai *et al.,* 2017; Sohil and Sharma 2020; Shafie *et al.,* 2023). Categorization procedures were: (1) Omnivores: those birds who feed on all things, both animal and plant materials. (2) Carnivores: birds feeding predominantly on vertebrates. (3) Piscivorous: birds primarily feed on fish but also arthropods, small crustaceans. (4) Insectivores: birds feeding predominantly on insects but also arthropods, small crustaceans. (5) Granivores: birds feed mainly on grains and seeds. (6) Frugivores: birds feeding on fruits or on seeds and fruits / nectar.

Food preference experimental for hooded crow

These experiments were prepared to examine which color and food type preferred for hooded crow birds. The experimental procedures were set up monthly during the survey period at the same places, as a response to farmers' complaints about crow attacks and because that the hooded crow was the second most dominant bird species in the area. In the early morning, at each site, 400 gm of five different types of baits were placed on a plastic sheet with different colors (red and blue), in a line form on the ground, 30 cm apart from one another. The order of the baits was changed

along the crossbar after 30 minutes of starting to avoid the preferences based on baits position rather than the bait types and the plastic sheet colors (Rothery *et al.*, 2017). The baits were monitored for 2 hours, then weighted and removed. Five different types of baits were used to luring the hooded crow as follow: Fish (Mediterranean sand smelt), Beef liver slices, Tamiya or Egyptian fava bean fritters (made with split fava beans, onion, fresh parsley, garlic cloves, fresh cilantro, ground cumin, ground coriander and salt), Crushed Yellow Maize, Chicken Intestine.

Data analysis

The records data about bird survey were tabulated and analyzing to obtain the relative abundance using the following formula: Relative abundance = n/N×100 Where, n is the total number of specific bird species and N is the total number of all bird species. The data were Statistical analysis using CoStat (2005) statistical software. Mean ± standard error (SE) of bird damage was calculated and differences between weeks were analysis at $p \leq 0.05$ level of significance by Duncan (1955).

RESULTS

Species formation

A total of 3877 individuals of birds, 21 species belonging to 17 families and 7 orders, were recorded throughout the study period (Table 1). Members of order Passeriformes were found to be the most abundant 2367 individuals, represented with 10 families (Alaudidae, Cisticolidae, Corvidae, Estrildidae, Hirundinidae, Motacillidae, Muscicapidae, Passeridae, Pycnonotidae and Sturnidae) holding 11 species (crested lark, graceful prinia, hooded crow, red avadavat, barn swallow, white wagtail, western yellow wagtail, bluethroat, house sparrow, common bulbul and common myna), followed by order Columbiformes with 862 individuals in one family (Columbidae) holding 2 species (rock pigeon and laughing dove). In the same trend, the order Pelecaniformes contains one (Ardeidae) family holding 2 species (cattle egret and little egret).

The order Coraciiformes, includes 2 families (Alcedinidae and Meropidae) with three species (pied kingfisher, common kingfisher and blue-cheeked bee-eater) with 162 individuals. Further followed by Bucerotiformes, Charadriiformes and Falconiformes each having one species (Eurasian hoopoe, Spur winged lapwing and Eurasian Kestrel) with 81, 56 and 35 individuals respectively.

Feeding guilds

Birds observed through our study were categorized into six feeding guilds: insectivores, granivores, piscivorous, carnivores, omnivores and frugivorous (Fig. 1). Granivorous bird species were the dominant (48.36%) followed by insectivores (21.56%), omnivores (17.57%), carnivores (8%), piscivorous (2.48%) while frugivorous was the last feeding guilds (2.04%). Granivorous birds are comprised of the Columbidae, Alaudidae, Estrildidae, and Passeridae species. The Upupidae, Charadriidae, Meropidae, Cisticolidae, Hirundinidae, Motacillidae and Muscicapidae, were mainly among insectivore's species. The prominent families in omnivorous species were Corvidae and Sturnidae. Carnivorous birds consist of Falconidae and some Ardeidae members, while piscivorous and frugivorous species were primarily from some Ardeidae and Pycnonotidae respectively.

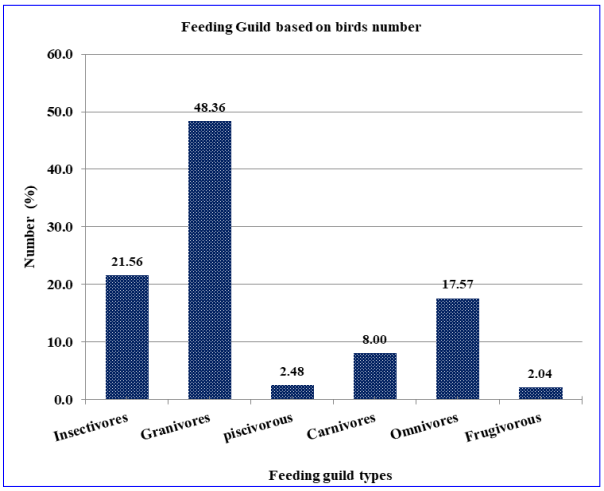


Figure (1): Percentage of different feeding guilds for bird species founded at El-Zahra village, Zagazig district, Sharkia Governorate during the survey period from April 2021 to March 2022.

Dominant birds

The recoded bird species were represented in Figure (2) with 5 bird species, which were house sparrow represented 34% of the 5 dominant species (908 individuals), followed by hooded crow represented 24% (649 individuals), while the rest third species were rock pigeon 23% (613 individuals), cattle egret 10% (275 individuals) and Laughing dove 9% (249 individuals). This suggests the House sparrow is the most prevalent and successful bird species occupying this particular habitat or community.

The cattle egret and laughing dove have lower relative abundances of 10% and 9%, respectively, indicating they are less dominant. Tracking changes in these relative abundance patterns of dominant birds over time can reveal important trends related to habitat alteration, environmental disturbances, or the introduction of invasive species.

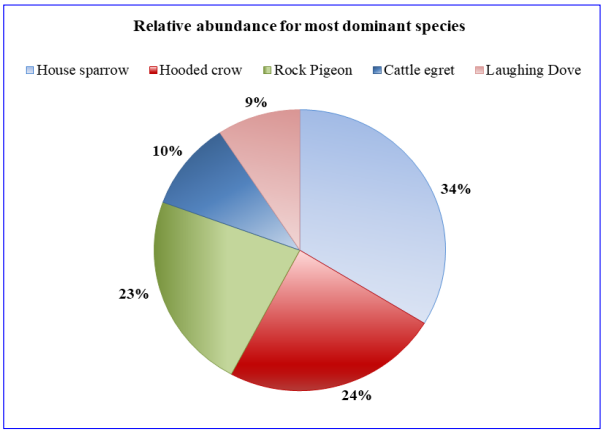


Figure 2: Relative abundance for the most dominant bird species found at El-Zahra village, Zagazig district, Sharkia Governorate during the survey period from April 2021 to March 2022.

Table (1): Bird species, total and mean numbers found at El-Zahra village, Zagazig district, Sharkia Governorate during the survey period from April 2021 to March 2022.

Common English name	Scientific name	Taxonomic position		Feeding† guild category	Total No.	Mean
		Order	Family			
Eurasian hoopoe	*Upupa epops major* Brehm, 1855	Bucerotiformes	Upupidae	I	81	6.75
Spur-winged lapwing	*Vanellus spinosus* Linnaeus, 1758	Charadriiformes	Charadriidae	I	56	4.67
Rock pigeon	*Columba livia schimperi* Bonaparte, 1854	Columbiformes	Columbidae	G	613	51.08
Laughing dove	*Spilopelia senegalensis* Linnaeus, 1766			G	249	20.75
Pied kingfisher	*Ceryle rudis rudis* Linnaeus, 1758	Coraciiformes"	Alcedinidae	P	49	4.08
Common kingfisher	*Alcedo atthis atthis* Linnaeus, 1758			P	8	0.67
Blue-cheeked bee-eater	*Merops persicus persicus* Pallas, 1773		Meropidae	I	105	8.75
Eurasian kestrel	*Falco tinnunculus tinnunculus* Linnaeus, 1758	Falconiformes	Falconidae	C	35	2.92
Crested lark	*Galerida cristata* Linnaeus, 1758		Alaudidae	G	83	6.92
Graceful prinia	*Prinia gracilis* Lichtenstein, 1823		Cisticolidae	I	194	16.17
Hooded crow	*Corvus cornix cornix* Linnaeus, 1766		Corvidae	O	649	54.08
Red avadavat	*Amandava amandava amandava Linnaeus, 1758*		Estrildidae	G	22	1.83
Barn swallow	*Hirundo rustica savignii* Stephens, 1817		Hirundinidae	I	180	15.00
White wagtail	*Motacilla alba* Linnaeus, 1758	Passeriformes	Motacillidae	I	154	12.83
Western yellow wagtail	*Motacilla flava pygmaea* Brehm, 1854			I	52	4.33
Bluethroat	*Luscinia svecica* Linnaeus, 1758		Muscicapidae	I	14	1.17
House sparrow	*Passer domesticus niloticus* Nicoll & Bonhote, 1909		Passeridae	G	908	75.67
Common bulbul	*Pycnonotus barbatus* Desfontaines, 1789		Pycnonotidae	F	79	6.58
Common myna	*Acridotheres tristis tristis* Linnaeus, 1766		Sturnidae	O	32	2.67
Cattle egret	*Bubulcus ibis* Linnaeus, 1758		Ardeidae	C	275	22.92
Little egret	*Egretta garzetta* Linnaeus, 1766			P	39	3.25
Total number recorded					3877	323.08

†I, Insectivores; G, Granivores; P, Piscivorous; C, Carnivores; O, Omnivores; F, Frugivorous.

Food preference

The illustrated data in Table (2) summarizes the performance or measurements of various categories across different months from April 2021 to March 2022. The Tamia category consistently shows high values of consumption (mostly 100) across both sheet types and throughout the months, indicating strong performance or stability in this measurement. Consumption of liver category also remains relatively high, particularly in the Red sheet, however, using blue some fluctuations were observed. Consumption of other categories recoded variability including chicken intestine and fish. Chicken intestine category shows more variability, with values ranging from approximately 30 to 100. The significant differences between months indicate that factors affecting this measurement may vary considerably. Meanwhile, the fish category displays lower values compared to Tamia and Liver, particularly in the earlier months. Zea maize consumption was zero over all months of the study (Table 2).

In general, tracking the percentage of different foods consumed over the months, it is clear that Tamia and liver reached their maximum consumption for most of the year, while consumption was lowest in July and August, respectively, for both the red and blue plastic sheets. Statistical analysis indicates a significant effect of the different bait types throughout all months of the study period.

Hooded crow color preference

To compare the consumption percentages of different bait types consumed by Hooded crows from April 2021 to March 2022 in red and blue plastic sheets, Table (2) reflects the analysis of various aspects, such as the overall trends in bait consumption, monthly variations, and mean consumption across different bait types and conditions. For overall trends, Tamia and Liver were consistently the most consumed bait types in both conditions (red and blue), with percentages mostly above 80%. However, monthly consumption in red and blue sheets showed variation across the study period. In April 2021, blue sheet in fish consumption was higher than in red. Chicken inte-stine and fish generally recorded lower consumption percentages for both sheet color. This trend for these bait types appears to be less stable across months. During May to March 2022, blue sheet maintained higher percentage for bait consumption compared to red sheet. Crush maize showed no attractive ability at any sheet color and recorded zero consumption.

In general, higher overall mean consumption was recorded for both Tamia and Liver in the blue condition compared to red (Tamia, 91.86%, Liver, 81.81% and Tamia, 95.88% and Liver: 88.33%, for red and blue sheets, respectively). The mean consumption for Fish was considerably higher in the blue plastic sheet (35.83%) than in the red (16.80%). Variation in the monthly consumption patterns also indicates that

Table 3. Variation in nutritional composition of hooded crow feeds: Seasonal trends and bait preference analysis, using different color sheet, during April 2021 to March 2022 under field conditions in Sharkia Governorate.

Months	Red sheet						Blue sheet					
	Tamia	Liver	Intestine	Fish	Crush Maize	LSD	Tamia	Liver	Intestine	Fish	Crush Maize	LSD
Apr.2021	100 ±0.00^{a}	100±0.00^{a}	100±0.00^{a}	53.33±8.82^{b}	0^{c}	12.43***	100 ±0.0^{a}	100 ±0.0^{a}	100 ±0.00^{a}	68.33±7.26^{b}	0^{c}	10.24***
May	100±0.00^{a}	100±0.00^{a}	46.67±4.41^{b}	11.67±11.67^{c}	0^{c}	17.58***	100±0.0^{a}	100±0.0^{a}	58.33±6.01^{b}	35.00±20.21^{b}	0^{c}	29.71***
Jun.	93.33±6.67^{a}	91.67±8.33^{a}	30.0±16.07^{b}	13.33±7.26^{bc}	0^{c}	29.05***	100 ±0.0^{a}	88.33±11.67^{a}	50.00±7.64^{b}	26.67±15.90^{bc}	0^{c}	29.80***
Jul.	74.00±3.21^{a}	25.0±14.43^{b}	21.67±11.67^{b}	16.67±8.33^{b}	0^{b}	29.02**	85.67±3.48^{a}	40.00±20.82^{b}	33.33±6.01^{b}	40.00±20.82^{b}	0^{b}	42.62*
Aug.	66.67±1.67^{a}	26.67±6.01^{b}	16.67±8.82^{bc}	13.33±8.82^{bc}	0^{c}	19.65***	65.00±5.77^{a}	31.67±20.48^{ab}	36.67±9.28^{ab}	28.33±14.24^{ab}	0^{b}	38.38*
Sep.	91.67±8.33^{a}	83.33±16.67^{a}	40.0±7.64^{b}	13.33±13.33^{bc}	0^{c}	34.03***	100 ±0.0^{a}	100 ±0.00^{a}	55.00±20.00^{b}	40.00±20.21^{bc}	0^{c}	40.06**
Oct.	90.00±10.0^{a}	90.0±10.00^{a}	73.33±4.41^{a}	15.00±8.66^{b}	0^{b}	24.18***	100±0.0^{a}	100±0.00^{a}	56.67±22.42^{b}	40.00±20.82^{bc}	0^{c}	43.11**
Nov.	93.33±6.67^{a}	83.33±16.67^{a}	100 ±0.0^{a}	8.33±8.33^{b}	0^{b}	27.89***	100 ±0.0^{a}	100 ±0.00^{a}	100±0.00^{a}	25.00±13.23^{b}	0^{c}	18.64***
Dec.	93.33±6.67^{a}	81.67±18.33^{ab}	53.33±6.67^{b}	13.33±7.26^{c}	0^{c}	30.80***	100±0.0^{a}	100±0.00^{a}	46.67±14.81^{b}	36.67±18.56^{b}	0^{c}	33.46***
Jan. 2022	100 ±0.00^{a}	100 ±0.00^{a}	61.67±23.15^{b}	21.67±13.02^{c}	0^{c}	37.43***	100±0.0^{a}	100±0.00^{a}	55.00±10.41^{b}	50.00±25.17^{b}	0^{c}	38.37***
Feb.	100 ±0.00^{a}	100 ±0.00^{a}	43.33±8.82^{b}	15.0±7.64^{c}	0^{c}	16.44***	100 ±0.0^{a}	100 ±0.00^{a}	51.67±11.67^{b}	28.33±15.90^{b}	0^{c}	27.79***
Mar.	100 ±0.00^{a}	100 ±0.00^{a}	100 ±0.00^{a}	6.67.0±6.67^{b}	0^{b}	9.39***	100±0.0^{a}	100±0.00^{a}	100 ±0.00^{a}	11.67±6.01^{b}	0^{c}	8.47***
mean	91.86±3.13^{a}	81.81±7.83^{a}	57.22±8.72^{b}	16.80±3.41^{c}	0^{d}	15.99***	95.88±3.05^{a}	88.33±7.16^{a}	61.94±6,97^{b}	35.83±4.08^{c}	0^{d}	14.22***

Data are presented as mean ± SE. Means within each row for the red and blue sheets separately, followed by different superscript letters, indicate a significant difference at the level of $p \leq 0.05$ according to Duncan's multiple range test. LSD, per row for the red and blue sheet separately, marked with***, indicate a highly significant difference among groups; ** indicates a significant difference; and * indicates a moderate significant difference.

hooded crows favored blue plastic sheets across most bait types, suggesting a possible influence of the color on their feeding preferences. Further investigations are in need to explain this phenomenon.

DISCUSSION

A total of 3877 individuals of bird species from 21 species, 17 families and 7 orders were recorded during this study, in contrast with other studies, it was low. As patterns, a total of 51 bird species from 30 families and 10 orders were recorded at Sharkia Governorate (Attia, 2006). The same trend was founded during 2019 also at Sharkia Governorate, with 33 bird species belonging to 24 families and 10 orders (Issa, 2019). Either at Gharbia Governorate, a total of 29 bird species belonging to 21 families with 10 orders were recorded (Metwally *et al.,* 2016). The variations in species numbers are by virtue of observers, time of the day & surrounded climate (Bibby *et al.,* 2000), also the variations in vegetation structure, food resources, availabilities of essential requirements, biotic and abiotic factors affect species numbers and distribution (Liang *et al.*, 2017; Sheta, 2019; Xu *et al.*, 2022).

Our finding reveals that the surveyed bird species belonged to 6 different guilds (insectivores, granivores, piscivorous, carnivores, omnivores and frugivorous). This indicates that the study area (El-Zahraa village as a rural or agricultural area) provide well suited (biotope) requirements such as food, resting, roosting, shelter, and nesting sites that attract diverse numbers of bird species for foraging sites. The vegetative structures of the study site were diverse from season to another with a fair diversity of trees, shrubs, water canals and drains, which support rich abundance of seeds, insects and other different feeding niches. As a result, about (48.36%) of the birds of the study area were Granivorous which reflects the variety of cultivated crops, where there's (wheat, alfalfa, broad bean, pea, onion, maize, rice, squash, tomato, scattered guava and ficus trees) growing. The insectivores (21.56%) were in the second rank, that's refer to abundance of insects which are related to crops, followed by the omnivores (17.57%), carnivores (8%) then piscivorous (2.48%) and frugivorous (2.04%). Theses in line with previous studies revealed that, granivorous birds were the highest rate amongst different types of guilds (Pangestu *et al.,* 2023), because granivorous bird is a main of the avifauna structure across the world (Franklin *et al.,* 2000); it's the predominant group in several or perhaps in most ecosystems (Turček, 2010). The complexity in vegetation structure for the study area, lead to a presence of abundant food resources including seeds, insects (homoptera, wasps, dragonflies, beetles) and aliments in agricultural fields (Ghosh *et al.,* 2022). Plant diversity is positively associated with insect diversity and abundance accordingly the abundance of insectivores (Pettorelli *et al.,* 2011). It's a source for proteins and nitrogen for birds (Stratford and Şekercioğlu, 2015). The bird guilds are differed according to the habitat and the time of the year, as example many bird species can use a mix of food resources for other reasons, such as in reproductive success, gather more insects for their chicks and nestling during breeding season. Other studies refer that insectivores were the dominant feeding guild followed by either omnivores or carnivores (Sohil and Sharma 2020), the same was recorded with (Azman *et al.,* 2011; Shafie *et al.,* 2023) they clear that the dominant was insectivores, followed by granivores and carnivores. Dominant species is known as species with high abundance proportion to another species in the community (Avolio *et al.,* 2019). The dominant bird species in this study were house sparrow, hooded crow, rock pigeon, cattle egret and laughing dove. This is matched with the finding of Issa (2019) that the relative abundance was highest with; house sparrow, hooded crow, rock pigeon, laughing dove and cattle egret. House sparrows are widely distributed in most habitats of the world, due to their ability to adapt to climatic conditions and local biotic factors (Hanson *et al.,* 2020). Identically, the omnivore diets for hooded crow birds allow them to consume various type of foods, is a common and widespread occurrence bird in Egypt (Ahmed *et al.,* 2018; Negm and Hassan2019).

The food preference experiments exhibited that hooded crow birds prefer Tamia food followed by liver than chicken intestine and finally fish, while it didn't consume any amount of crushed maize. We suggest that the preference behavior for Tamia, attribute to its ingredients (vegetable, protein and oil) and there's a phenomenon in animals called high-fat foods preferring phenomenon where animals is need to fat for physiological demands (as body temperature or a source for many hormones (Manabe *et al.,* 2010), or may be according to the acclimation behavior for hooded crow to life as a neighbors to human settlements and share the human or anthropogenic resources (Sun *et al.,* 2024). Another explanation for that preference is the flexibility in using resources and plasticity behavioral which enable crows to exploit unusual resources for feeding and nesting (Benmazouz *et al.,* 2021). The food that comes from animal origin is a very major portion of crow diet (Zduniak, 2006), so hooded crow predates and feed on other species birds, fish and even life fish (Zduniak *et al.,* 2008; Kövér *et al.,* 2018).

CONCLUSION

This study has effectively documented the bird species composition and feeding guilds within the agricultural landscape of El-Zahraa village in the Zagazig district of Sharkia Governorate, Egypt. The survey revealed a diverse assemblage of 21 bird species spanning 17 families and 7 orders, with a notable dominance of the order Passeriformes. This group, particularly granivorous and insectivorous birds, highlighted the agricultural ecosystem's richness and its critical role in supporting wildlife diversity. The results indicate that agricultural areas can serve as vital habitats for various bird species, which contribute

significantly to ecological balance by engaging in pest control and seed dispersal. The predominance of certain species, including the house sparrow and hooded crow, underscores the adaptability of birds in agricultural environments. Additionally, the food preference experiments conducted on the hooded crow provide valuable insights into dietary choices, which could inform management strategies for local bird populations. Generally, this research emphasizes the importance of maintaining healthy agricultural ecosystems not only for crop production but also for the sustenance of avian biodiversity. Future conservation efforts should focus on enhancing habitat quality and promoting practices that support bird communities while harmonizing agricultural productivity and ecological health. Understanding the intricate interactions between bird species and their feeding habits paves the way for targeted strategies in wildlife management, raising both agricultural success and biodiversity conservation in the region.

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تكوين انواع الطيوروتنوع عوائلها في المناطق الزراعية بمركز الزقازيق محافظة الشرقية مصر

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الملخص العربي

يعد وجود الطيور في النظام البيئي الزراعي أمرًا بالغ الأهمية للحفاظ على التوازن، لما له من تأثيرات بيئية مختلفة. تم دراسة تركيب أنواع الطيور وطوائف تغذيتها في الأراضي الزراعية بقرية الزهراء، مركز الزقازيق، محافظة الشرقية، مصر. حيث تم استخدام طريقة الحساب النقطي لحصر أنواع الطيور وذلك في الفترة من أبريل 2021 إلى مارس 2022 ، ولقد أظهرت النتائج وجود 21 نوعًا من الطيور تنتمي إلى 17 عائلة و7 رتب. كانت رتبة العصفوريات Passeriformes هي الأكثر وفرة وتتكون من 10 عائلات هي Alaudidae، Cisticolidae, Estrildidae، Pycnonatida, Corvidae، Hirundinidae، Motacillidae ، Sturnidae ، Muscicapidae ، Passeridae . واوضحت نتائج تقسيم الطيور تبعا لطبيعة التغذية الي ان الطيور اكلة الحبوب Granivorous واكلة الحشرات insectivores اكثر تعداد من الطوائف الاخري ويليها الطيورالكانسة Omnivores وآكلة اللحوم Carnivores، وآكلة الاسماك piscivorous بينما كانت الطيورآكلة الفواكة Frugivorous اقلها تعدادا. بالنسبة لأنواع الطيور السائدة فقد كانت ممثلة بـ 5 أنواع؛ عصفور النيل الدوري House sparrow ، والغراب البلدي Hooded crow ، والحمام البري Rock pigeon ، وابوقردان Cattle egret ، واليمام البلدي Laughing dove. أظهرت تجارب التفضيل الغذائي للغراب البلدي أن هذة الطيور تميل إلى تناول الطعمية ثم الكبدة وأمعاء الدجاج والأسماك علي التوالي ، في حين انها لم تأكل أي كمية من جريش الاذرة. وبالنسبة لتجارب تفضيل الالوان للغراب البلدي، فقد أظهرت النتائج ان الطيور تفضل تناول الطعام الموجود على الغطاء البلاستيكي الأزرق أولاً ثم الطعام الموجود على الغطاء البلاستيكي الأحمر. وان وفرة أنواع الطيور وتنوع طوائفها في المنطقة محل الدراسة ليعكس غناها بالموارد الغذائية الملائمة لانواع الطيور المختلفة. في حين السلوك التفضيلي الغذائي للغراب البلدي قد يساعدنا على استخدام هذا الطعام المفضل والأرخص (الطعمية) كمادة حاملة لجذب هذه الطيور والسيطرة عليها.