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INSECT ORDER THAT THE BLUE-CHEEKED BEE-EATER *MEROPS SUPERCILIOSUS PERSICUS* PALLS, 1773 (CORACIIFORMES: MEROPIDAE) CHICKS FEED ON IN THE PROVINCES OF BAGHDAD AND BABYLON

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Abstract

This study was conducted in Jadiriyah, Baghdad and the Emam, Babil provinces during 2017-2018. Results showed that there were significant differences in the order of insects that birds feed on in the nestling during the day and between the weeks. The highest insect rate was in the first week for order Odonata in Babylon and Baghdad when scored 7 and 10 insect in the morning period respectively. Whereas it scored 7 - 8.4 insects) and (5.3 - 6 insects) in the afternoon and evening respectively. The order Orthoptera scored the lowest rate with 1.3 - 1, 0.6 - 0.6 and 0.3 - 1.3 insects for the morning, afternoon and evening periods, respectively. The number of insects orders started increasing during the second, third and fourth week when the Odonata scored (19.3, 44.3 and 61.6 insects), (14.3, 34.3 and 53.3 insects) for the morning Respectively, (11, 20.3 and 16.6 insects) (8, 15.6 and 19.6 insects) for the afternoon respectively (15.3, 35.3, 45 lactation), 12, 30 and 40.6 insects respectively for the evening period, respectively and the lowest for Orthoptera (1.3, 0.6 and 2.2 insects) (0.6, 1.6 and 1.3 insects), 0.6, 0.6 insect (respectively), 1.3 (1.3, 1.6 insect) and 0.6, 0.3 and 0.6 respectively 2 insects) for the evening. We conclude that the number of insects that chicks feed on the increase with age and prefer large insects, especially dragonflies for feeding.

Introduction

Merops spp. is an Iraqi bird (Lois, 1963) belongs to the family Meropidae within the order the Coraciiformes. All members belong to this family are fed exclusively on bees and wasps. Atakishiev (1970) reported that aviary birds often feed in groups on large numbers of bees in the bee-barn. For example, Ambrose (1978) indicated that the bee-eater bird is useful in Russia. Whereas it is a dangerous pest in other countries including Iraq Glaiim (2010). Range map (2016) showed that *M.s. persicus* is spreading in the grasslands, forests and coastal mountains of East Africa mainly, the coasts of Angola and India. Whereas, Fry (2016) included Eastern Ethiopia, Somalia, Kenya, South-East Africa, southern Mozambique and Zimbabwe, the Comoro and Madagascar islands as this bird habitat as well. Whereas, *M. alternans* is located in western Angola and north-west Namibia. Asokan (2003) mentioned *M. orientalis* feeds on flying insects such as beetles, bees, dragonflies, butterflies, bugs and locusts in exposed areas. Gulati and Kaushik (2004) referred to the predation of *M. orientalis* on honeybees when found that the predation rate was 708±111.2 meal/day. The highest predation time was between 10 pm to 1 am and the lowest was at 6 pm. Due to the few studies on the bee-eater bird *M.s. persicus* in the Iraqi environment, the aim of this study was to identify the types of insects that it feeds on and the chick feeding time throughout the day (morning, noon and evening) during the period of chick rearing.

Materials and methods

Locating the nests places

Three nests were identified in the study areas of in Jadriya and the Emam in Baghdad and Babil provinces, respectively. Controlling cameras (Mentions camera model, manufacturer and country of origin) were installed on one side of the tunnel with a distance of 1 m.

Insects orders determination and estimation

The types and numbers of insect orders were identified through the cameras that are set weekly and three time intervals during the day (8-10 am, 2-12 pm and 4-6 pm). The types and numbers of insect levels fed on by the chick were calculated during their age stages.

Results and discussion

The average of insect orders fed on by the chick during the daytime in Babil province

The results of table 1 showed that there were significant differences in the levels of insect larvae fed on during the day and among the weeks. The highest rate was in the first week for the Odonata order, which scored 10, 7 and 8.4 insects for the morning, afternoon and evening periods, respectively. For Orthoptera, the rate was 1.3, 0.6 and 0.6 insects for the same periods, respectively. It is noted from the table that the number of insect orders began to increase during the second, third and fourth weeks. In the second week, Odonata scored the highest rate at 19.3, 11 and 15.3 insects for the morning, afternoon and evening periods, respectively. While, the lowest rate was scored f for Orthoptera at 1.3, 0.6 - 1.3 insects for the same periods, respectively. The third week was the highest rate for Odonata when scored 44.3, 35.3 and 20.3 insect for the morning, afternoon and evening periods, respectively, while the lowest was scored for of Orthoptera, which was 0.6, 1.6 and 1.3 insects for the same periods, respectively. In the fourth week, Odonata had the highest rate of at 61.6 insects for the morning period, while it was 45 and 16.6 insects for the afternoon and evening periods, respectively. The lowest level was scored for Orthoptera with 2.2, 1.6 and 3.3 insects for the same periods, respectively.

Significant differences between the first and fourth weeks was shown for the types and numbers of the insect orders on which the chicks fed. During the morning period, the insect rate was 19.3 insects. In the evening, it was 14.3 insects. The Odonata rate was the highest during the day, reaching 41.06 insects. The lowest level was for the order Orthoptera at 1.7 insects during the day.

Table 1: The average of insect order fed on by the chick during the daytime in Babil governorate

Weeks	Order	Average number of insect order by timing				Values
		8-10	12-2	4-6	the average	LSD
First week	Odonata	10	7	8.3	8.4	2.88
	Hymenoptera	5	3.6	4.3	4.3	1.96
	Orthoptera	1.3	0.6	0.6	0.8	0.82
	Lepidoptera	1.6	1	2	1.5	1.27
	the average	4.4	3.05	3.8	the average	Values LSD
Values LSD		3.38	2.95	3.07		
Second week	Odonata	19.3	11	15.3	15.2	3.57
	Hymenoptera	5	4	5.3	4.7	2.82
	Orthoptera	1.3	0.6	1.3	1.06	1.03
	Lepidoptera	2.3	1.6	5	2.9	3.05
	the average	6.9	4.3	6.7	the average	Values LSD
Values LSD		4.69	3.72	4.16		
the Third week	Odonata	44.3	20.3	35.3	33.3	5.89
	Hymenoptera	6.6	4.6	6.6	5.9	3.62
	Orthoptera	0.6	1.6	1.3	1.1	1.28
	Lepidoptera	3.6	1.3	2.6	2.5	2.76
	the average	13.7	6.9	11.4	the average	Values LSD
Values LSD		6.52	5.36	5.09		
Fourth week	Odonata	61.6	16.6	45	41.06	7.85
	Hymenoptera	8.6	6.3	6.3	7.06	3.77
	Orthoptera	2.2	1.3	1.6	1.7	1.97
	Lepidoptera	5	4.6	4.3	4.6	2.63
	the average	19.3	7.2	14.3	-	-
Values LSD		6.94	4.61	6.07	-	-

The average of insect orders fed on by chicks during daylight hours in Baghdad governorate

The results of table 2 showed that there were significant differences in the levels of insect larvae fed on during the day and between the weeks. The highest rate was in the first week for the Odonata order with 7, 5.3 and 6 insects in the morning, afternoon and evening periods, respectively. For the order Orthoptera, the predatory rate was 1, 0.3 and 1.3 insect for the morning, afternoon and evening respectively. It is noted from the table that the number of insect orders started to increase during the second, third and fourth weeks. In the second week, the highest predotary rate was on the order Odonata when scored 14.3 insects for the morning period, while it scored 12-8 insects for the afternoon and afternoon, respectively. The lowest predatory rate was on the order Orthoptera with 0.6, 1 and 0.6 insect for the morning, afternoon and evening periods, respectively. In the third week, the highest predatory level on Odonata was 34.3, 15.6 and 15 insects for the morning, afternoon and evening periods,

Table 2: The average number of insect ranks fed by the chick during daylight hours in Baghdad governorate

Weeks	Order	Average number of insect order by timing				Values LSD
		10-8	2-12	6-4	the average	
First week	Odonata	7	5.3	6	6.1	2.36
	Hymenoptera	4.3	3.6	4.3	4.06	2.06
	Orthoptera	1	0.3	1.3	0.8	1.29
	Lepidoptera	2.3	1.3	3	2.2	1.96
	the average	3.6	2.6	3.6	the average	Values LSD
Values LSD		3.46	3.52	3.79		
Second week	Odonata	14.3	8	12	11.4	3.79
	Hymenoptera	9.3	5.3	7.3	7.3	3.57
	Orthoptera	0.6	1	0.6	0.7	0.862
	Lepidoptera	2.3	2.3	4	2.8	2.75
	the average	6.6	4.1	5.9	the average	Values LSD
Values LSD		4.58	3.66	3.98		
the Third week	Odonata	34.3	15.6	30	26.6	6.55
	Hymenoptera	12.6	7.3	9	9.6	4.18
	Orthoptera	0.3	0.6	0.3	0.4	0.48
	Lepidoptera	3	1.6	3.3	2.6	2.42
	the average	12.5	6.2	10.6	the average	Values LSD
Values LSD		5.82	4.69	5.21		
Fourth week	Odonata	53.3	19.6	40.6	37.8	6.22
	Hymenoptera	12.6	6.3	9.6	9.5	4.53
	Orthoptera	1.6	0.6	2	1.4	1.09
	Lepidoptera	3.6	4.3	5	4.3	2.37
	the average	17.7	7.7	14.3	-	-
Values LSD		8.33	5.87	7.14	-	-

respectively. The lowest rate was for Orthoptera which scored 0.3, 0.6 and 0.3 insect, for the same periods, respectively. In the fourth week, the highest predatory level on the order Odonata was 53.3, 40.6 and 19.6 insects for the morning, afternoon and evening periods, respectively. While the lowest feeding rate was on Orthoptera when scored 2.2, 1.6 and 1.3 insects for the same periods, respectively.

The table also showed significant differences between the first and fourth week for the types and numbers of insect orders on which the chicks were fed. During the morning period, the insect rate was 17.7 insects. In the evening, it was 14.3 insects. Feeding on the order Odonata was the highest in the day which scored 37.8 insects and while the lowest was on Orthoptera with 1.4 insect during the day.

The results suggested that the morning feeding period of the bee-eater bird chicks was the highest in both study areas then started to decrease during afternoon periods and then increased during the evening. The reason for the high feeding rate in the morning period may be due to the fact that the insects and birds are at the maximum activity in terms of spread, the environmental conditions appropriation for both insects and birds. The bird also takes sufficient time to rest during the night before hunting in the morning. In contrast, fewer insects caught by the bird during the afternoon because of the low insect activity and birds as well as a result of high temperatures during this period. When temperature dropped bird activity increased again, but less than in the morning period. To improve the environmental conditions, therefore, are correlated to both insects and birds activity affecting bird hunting and chick feeding rates. McCarty (2001) and Winkler *et al*., (2013) indicated insect activity depends mainly on local weather conditions because insects are less active at low temperatures or rainfall. Korodi ORODI Gall, Libus (1968), Kiss and Hohn (1980) pointed out that in Romania the activity of *M. apiaster* in the feeding of chicks starts from 7 am to 9 pm depending on the environment conditions of high temperature, clear weather, absence of wind and low humidity. These are suitable for flying insects, especially the Hymenoptera, Odonata, Lepidoptera and Coleoptera which are the main diet for chicks. Ali and Asokan (2015) noted that there are several factors that affect the daily activities of *M. orientalis*, such as the availability of food, environmental conditions and the existence of natural enemies.

During the study, it was observed that the two parents preferred to feed the chicks on larger-sized insects such as Odonata, while they feed themselves on the smaller sizes. The reason is that they are large in size, easy to observe, high availability in the nesting area, fast to catch and high nutritional value. Similarly, Carlsson (1983) and Hegner (1982) found these birds feed chicks on big size pries. In contrast, Fuisz *et al.*, (2013) found, Hymenoptera was the highest order in chick diet provided by European bee-eater *M. apiaster* in Hungary. This order scored 50, 48 and 35% in the three Hungarian colonies involved, namely, Albertirsa, Nagykarácsony and Pócsmegyer, respectively. While, the lowest was Hemiptera which was 2, 0, 0% respectively. Other insect orders were, including

Coleoptera, Diptera, Lepidoptera, Odonata and Orthoptera were varied.

It is observed that adult birds prefer feeding on hymenopteran insects. Whereas, this order came seconds after Odonata in chicks feeding. The reason could be most of the insects belonging to of this order are poisonous which my threat chicks life due to the low poison toleration. Thus, the bird may have some kind food selection behavior to protect the chicks.

The reason for the dietary diversity may be due to the fact that the bird feeds its offspring by mixing a variety of insects to support chick diets with necessary nutrients including essential amino acids that may not occur in one type of insect. John and Mark (1984) indicated, the European bee-eaters *M. apiaster* chicks fed on a mixture consisted of the dragonflies and bees were shown better growth parameters than those which fed on bees or dragonflies alone.

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