International Journal of Current Research in Life Sciences
Vol. 06, No. 09, pp.736-740, September 2017
IJCRLS
www.ijcrls.com

Full Length Research Article

DIET COMPOSITION OF BLACK-WINGED KITE (*Elanus caeruleus*) INHABITING THE ARID ZONE OF RAJASTHAN

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Accepted 24th August, 2017; Published Online 29th September, 2017

ABSTRACT

This study of Black-winged kite (Elanus caeruleus) was conducted during the 2012-2014 in 100 km2 area in and around Churu and Ratangarh city (Churu district) of Rajasthan, India (Lat 29˚ N, Long 75˚ E and 286 Msl). It is a small diurnal bird of prey. It belongs to a larger family called Accipitridae, along with the hawks, eagles and old vultures. Black-winged kite feeds mainly on small rodents it is usually considered to be rodent specialist but it also takes a variety of insects (locusts, grasshoppers, crickets, beetles), lizards, rodents such as shrews and rats, small birds, occasionally small snakes and frogs. Primarily the Black-winged kite found to feed on rodents, lizard, frog, insects and birds. Its diet composition was determined. Major components of stomach contents were identified as rodents (85 to 87%) in which rats (74% to 75%) were large in number than house mice (10 to 11%), insect (5 to 6%), frog (1 to 2%), birds (3 to 4%), lizard (3 to 4%). Eighteen intact faecal pellets were collected of which seven obtained from grazing field and remaining from the nests of rural area. Faecal pellets collected from glazing field (n = 7) analyzed. They contained undigested bones of rodents (84 to 88%), birds (1 to 2%). I have observed undigested elytra and leg parts of insects (5 to 6%), lizards (3 to 4%) unidentified material (3 to 4%) observed in faecal pellets. In AFH (Agriculture farm houses), SD (Sand dunes), FA (Forest area), GF (Grazing field) and GYA (Graveyard). Black-winged Kite was found to feed on rats and mice. To eating insects have been seen AFH, SD, FA and GF. In monsoon season the Black-winged Kite was found to capture frog from AFH. The Black-winged Kite eat lizard & small snakes in all microhabitats. In AFH and FA Black-winged Kite was found feed on the birds.

Key words: Diet composition, Black-winged Kite, Arid zone, Rajasthan, India.

INTRODUCTION

Black-Winged kite, *Elanus caeruleus* is a small diurnal bird of prey. It belongs to a larger family called Accipitridae, along with the hawks, eagles and old vultures. It may descend from perch to capture prey on the ground, hunt on the wing, descending upon prey after hovering, or pursue prey by quartering. It prefers to hunt during the day, particularly early morning and late afternoon, often hovering with its wings held upright in a V-shape, before dropping down and grabbing prey with its talons. Prey items are eaten while flying or on a perch, which can be a high tree or an artificial structure e.g. a power pole. Its main prey are small mammals, although it sometimes eats reptiles, birds and insects (Cramp and Simmons 1980). They rely almost exclusively on rodents as prey (Waian and Stendel 1970). Best known for its habitat of hovering over open grasslands in the manner of the much smaller kestrels. Black-winged kite feeds mainly on small rodents it is usually considered to be rodent specialist (Mendelsohn and Jaksic 1989, Scheibler 2004, Leveau *et al.*, 2002, Sarasol *et al.*, 2007) but it also takes a variety of insects (locusts, grasshoppers, crickets, beetles), lizards, rodents such as shrews and rats, small birds, occasionally small snakes and frogs (Naoroji, 2006). The Black-winged Kites flies slowly during hunting like a harrier, but it also hovers like a Kestrel. It has on rare occasions been known to hunt prey in flight (Lamba 1969). Their prey includes grasshoppers, injured birds, small snakes and frogs have also been reported (Ali and Ripley 1978). According to Bergier (1982) it feeds on mammals (48%) and birds (40%). Perches are used for hunting and for feeding but large prey may sometimes be handled on the ground (Tarboton 1978).

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MATERIALS AND METHODS

This study of Black-winged kite (*Elanus caeruleus*) was conducted during the 2012-2014 in 100 km2 area in rural and urban area of Churu and Ratangarh city (Churu district) of Rajasthan, India (Lat 29˚ N, Long 75˚ E and 286 Msl).

Food Analysis,
Feeding sites used by the Black-winged Kite were located and food samples were collected exactly from the feeding site.

Such immediately preserved in 70% alcohol, brought fresh weight of each specimen were measured and identified up to family, genus or species level whenever possible. Food component of the Black-winged Kite was studied by non-destructive methods because killing of bird in not desirable. Therefore, following methods were employed.

(1) Stomach content

Chicks founded dead under the nests were collected in a plastic bag and brought to the laboratory. Stomach content of each chick, was removed and its fresh weight was determined. Samples then immediately preserved in 70% alcohol and stored in freezer before analysis. The samples were examined within two months after collection. Each identifiable piece of food item was separated and number of each food item was determined. Beetles were identified from fragments of elytra, mandible, maxilla, leg parts and thorax by comparing with reference specimen. Number of thorax is used to estimate number if beetles in the stomach content.

(2) Faecal pellet analysis

During field observations, the Black-winged Kite was found to defecate faecal pellet of typical size, shape and colour. These pellets were collected monthly during morning hours. Pellets were identified based on their morphological features and collected manually and stored in air tight small container of plastic. For each pellet, information regarding date and place of collection were recorded. Before analysis pellets were dried in hot over at 60˚c to remove all moisture content, cooled and weighted. After drying, to identify different undigested prey items, pellets were teased carefully to separate the indigestible components such as insect body parts, bones of small animals, indigestible parts of birds etc. as describe by Huang *et al.* (2006). The parts of insect exoskeleton were observed under the microscope. For identification, up to order and classified on the bases of standard reference guides (Mc Gavin 2000). For better identification of the bony parts they were kept in 5% KOH solution overnight for bleaching.

(3) Direct field observation

The Black-winged Kite is habituated to human presence and could be approached very closely to about 5 to 30 m. Therefore, the Black-winged Kite taking food item larger than 2 cm could be easily identified by direct observation with 10 X 50 Olympus binocular. Some dead rodents, some bones of vertebrates, some feathers of birds, different body parts of birds and rats are seen by direct observation in the nest of Black-winged Kite. Some body parts of animals, bones and food material are seen under the tree where the Black-winged Kite made their nest.

RESULTS

Food and faecal matter analysis

Various prey items were recorded in the food sample analysis, which were tabulated in Table: 2. Direct feeding observations on the Black-winged kite showed its carnivorous nature in feeding and prey selectivity. Primarily the Black-winged kite found to feed on rodents, lizard, frog, insects and birds. Its diet composition was determined by following methods.

(a) Stomach content analysis

Dead juvenile was collected from the ground below the nest of the Black-winged Kite. Major components of stomach contents were identified as rodents (85 to 87%) in which rats (74% to 75%) were large in number than house mice (10 to 11%), insect (5 to 6%), frog (1 to 2%), birds (3 to 4%), lizard (3 to 4%). These sample collected from Khariya and Gorisar (Fig: 1 and 2)

(b) Faecal pellet analysis

Eighteen intact faecal pellets were collected of which seven obtained from grazing field and remaining from the nests of rural area. Faecal pellets collected from glazing field (n = 7) analyzed. They contained undigested bones of rodents (84 to 88%), birds (1 to 2%). I have observed undigested elytra and leg parts of insects (5 to 6%), lizards (3 to 4%) unidentified material (3 to 4%) observed in faecal pellets (Fig: 3 and 4). The detail analysis of faecal sample collected from rural area was mentioned in Table 1.

Table 1. Diet composition of the Black-winged kite (*Elanus caeruleus*) (data from pellets and prey remains)

Species	N	% N	Biomass consumed (g)	% Biomass
Locust	1	0.59	0.25	0.003
Cricket	2	1.19	0.77	0.009
Grasshopper	3	1.79	1.02	0.012
Beetles	3	1.79	0.81	0.009
Total insects	9	5.36	2.85	0.033
Small snakes	1	0.59	75	0.89
Lizard	3	1.79	40	0.47
Total Reptiles	4	2.38	115	1.36
Pigeon	1	0.59	390	4.62
House sparrow	3	1.79	516	6.1
undetermined Aves	2	1.19	760	9
Total Aves	6	3.57	1666	19.72
Brown Rat (*Rattus norvegicus*)	124	73.81	5908	69.95
House mouse (*Mus musculus*)	20	11.91	560	6.63
Undetermined Mammalia	2	1.19	137	1.62
Total Mammalia	146	86.91	6605	78.2
Bufo melanosticus	1	0.59	20	0.24
Rana tigrina	2	1.19	38	0.45
Total Amphibions	3	1.78	58	0.69
Total Prey	168	100	8446.85	100

Table 2. A list of prey item obtained from the food sample analysis made of sample collected from the 5 microhabitats, (+) sign indicates the presence of a prey in respected microhabitat.

Common name	Phylum/ class	Habitat				
		AFH	SD	FA	GF	GYA
Insects	Arthropoda	+	+	+	+	+
Frog	Amphibia	+				
Lizard	Reptiles	+	+	+	+	+
House sparrow, Pigeon	Aves	+		+		
Mice, Rats	Mammalia	+	+	+	+	+

(c) Field observations

The Black-winged Kite seasonally utilized different foraging habitats. Therefore, a wide variety of food items were recorded in its diet (Table: 1). The Black-winged Kite was often found to snatch into grasshopper, locust, cricket, frogs, lizards, rats, mice, snakes, pigeon and house sparrow at study

area. Twelve species of prey, belonging of five prey groups were registered in the diet (Table: 1). The most common prey was rodents, primarily rats and mice. The second important group of foods was insects, birds, lizards, snakes and frogs. I have seen prey remains in the nest and nesting area of the Black-winged Kite during the field observation. In AFH, SD, FA, GF and GYA Black-winged Kite was found to feed on rats and mice. To eating insects have been seen AFH, SD, FA and GF. In monsoon season the Black-winged Kite was found to capture frog from AFH. The Black-winged Kite eat lizard & small snakes in all microhabitats. In AFH and FA Black-winged Kite was found feed on the birds.

Fig:1. Stomach content analysis of dead chick of Black-winged kite found at Sukha Ram's (Khariya) farm house site.

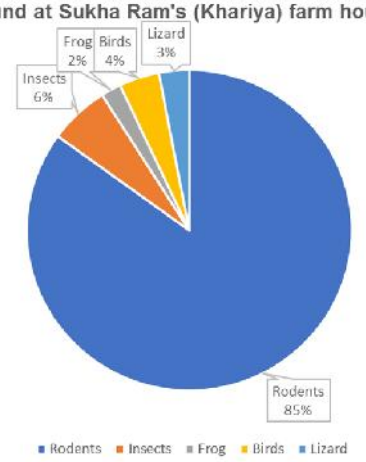


Fig:2. Stomach content analysis of dead chick of Black-winged kite found at Mohan Ram's (Gorisar) farm house site.

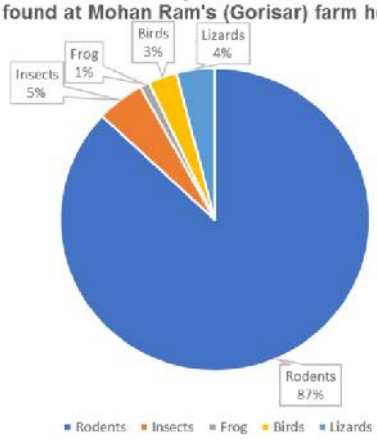


Fig:3. Faecal sample analysis of Black-winged kite collected from grazing field of rural area of Khariya.

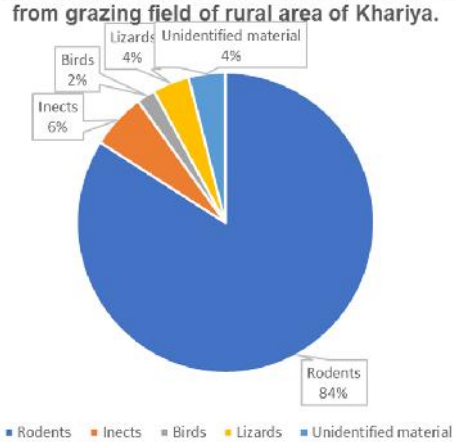
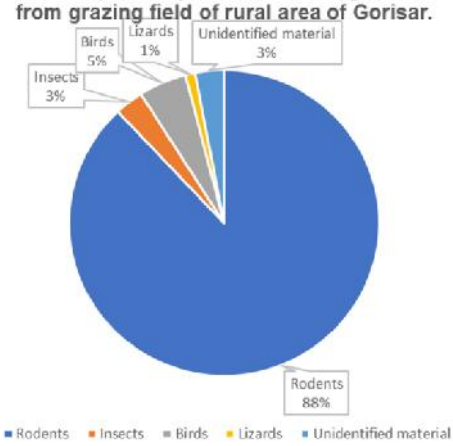


Fig:4. Faecal sample analysis of Black-winged kite collected from grazing field of rural area of Gorisar.



DISCUSSION

In present study, it was found that in the species which has adapted to rural environment the major sites for source of food is concentrated near agriculture farm houses, grazing fields, forest areas and also sometimes around human inhabitations. The pellets of the Black-winged kites show the remains of insect's exoskeleton, bony remains and undigested parts. In our study, it was found that Black-winged kite feeds mainly on rodents and in rodents, it is mainly feed on rats. It is similar that the Black-winged kite is usually considered to be a rodent specialist (Mendelsohn and Jaksic 1989, Scheibler 2004, Sarsola *et al.* 2007). In this study, I found that the Black-winged kite feeds on birds (3.57%), it is dissimilar with Bergier 1982, who says 40% prey of this bird was birds but my results are so down than it, it may be possible due to abundant number of available population of rodents, on which the Black-winged kite feeds mostly. The result of the present study on Black-winged kite stresses on the dependence of the birds on the dependence of the bird on rodents of agricultural farm houses, the easy availability of food near human inhabitations and adaptation on the part of the bird to such rural area. The data collected on the basis of the undigested food on the pellets of birds shows such results. Churu district located in the arid zone of Northern Rajasthan, India having hot and dry summers and scarcity of rains, gives a challenging ecological adaptation base to the Black-winged kites. The species is threated by use of rodenticides and pesticides within its range. In agricultural areas the farmers use rodenticides for killing rats and mice and major part of food of Black-winged kite is rats so rodenticides and pesticides are very harmful for Black-winged kite on the basis of the observation of nests and pellets of the Black-winged kite, the presence of remaining parts of rodents, feathers of birds, exoskeleton of insects and the presence of other food stuffs shows changes in feeding habitats with the changing locality the ecology of an area is an important factors in deciding these feeding behaviors. Under the nests of Black-winged kite, presence of bones of rodents, feathers of other birds like pigeon and body parts of such small birds, lizards and animals shows variety of prey species taken as food by the Black-winged kite.

The results of the present study show that the energy needs of the birds are fully satisfied by the presence of plenty of food in the rural area of Churu district, arid zone of Rajasthan, region providing enough time and energy and help them soar and

breed freely. The availability of plenty of biomass as food is an area give advantage to these birds over those who rely on limited biomass in limited areas and spent much of their time and energy in hunting and searching food. Diversity in prey of the Black-winged kite like insects, birds, lizards and rodents in several foraging grounds clearly evokes the strategic adaptation for the resource utilization. The Black-winged kite accepts less profitable prey encountered while foraging. Because it can be consumed quickly without reducing foraging efficiency. It is feeding on many potentially harmful rodent and insects in crop-fields show its tremendous role in crop protection in the arid zone of Rajasthan.

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