



HABITAT ECOLOGY OF ASIAN KOEL *EUDYNAMYS SCOLOPACEUS* IN AGROECOSYSTEM

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ABSTRACT

The important role of birds in agriculture has long been recognized. The present study on the habitat, feeding and roosting behavior of Asian Koel (*Eudynamys scolopaceus*) in agro ecosystem of Punjab was carried from August 2021 to July 2022 at the Punjab Agricultural University (PAU), Ludhiana. It was conducted in three study areas i.e. study area A (agricultural field area), B (tree plantation area) and C (residential/ roadside area). The annual relative abundance of House Crow (*Corvus splendens*) was highest everywhere whereas of Asian Koel was 1%, 2.04% and 2.66% at study area A, B and C respectively. The feeding behavior of Asian Koel revealed that fruits and berries were preferred. It was found roosting mainly on Dhek, Neem, Peepal, Purple Bauhinia and Safeda trees. Asian Koel was most active during summer months and during the winters, it is not observed which might be because of its southward local migration.

Key words: Feeding, roosting, safeda, abundance, House Crow (*Corvus splendens*), line transect method, cuculiformes, omnivorous, fruits and berries, residential area, Common Myna (*Acridotheres tristis*)

Asian koel i.e., *Eudynamys scolopaceus*, of order cuculiformes measures about 38-46 cm and weighs 180-240 g (Choudhary, 2020). Asian koel shows sexual dimorphism with its conspecific. The behavioral practices show that it is generally omnivorous (Limparungpatthanakij, 2020). It is mainly known for its loud noise during its breeding season (Khan and Qureshi, 2020). Therefore, the present study was done because Asian koel is major concern due to its brood parasitic behavior with its different host species like house crow, common myna, black drongo (*Dicrurus macrocercus*) etc. as said by Nahid et al. (2016). The aim of the study was to explore the annual relative abundance of Asian koel with different bird species in three study areas of Ludhiana region on Punjab. Along with this, the feeding and roosting behavior of asian koel was also documented.

MATERIALS AND METHODS

The observations on Asian koel were carried for one year i.e. from August 2021 to July 2022 in Punjab Agricultural University (PAU), Ludhiana. The line transect and point count method (Kler and Kumar, 2015) was used for the study and the observations were taken twice a week, both during morning (6:30 to 8:30 am) and evening (4:30 to 7:30 pm). Identification of birds was done as per the keys given by Ali (2002).

Standardized common and scientific names of the birds were described as per description given by Jayadevan et al. (2016). The observations on the annual relative abundance, feeding and roosting of Asian koel were made in three different study areas of PAU, Ludhiana viz. study area A (agricultural field area), study area B (tree plantation area) and study area C (residential/ roadside area). Abundant tree species were observed at study areas B and C as compared to study area A. The Mann-Whitney U test with software version SPSS16.0 was applied on comparative relative abundance of bird species of all the study areas. The study also categorizes bird species on the basis of their feeding habits as insectivorous (I), granivorous (G), fruits/ berries (F), plants/ aquatic vegetation/ nectar (P), small invertebrates (SI), small vertebrates/ fishes/ mice/ rat/ small birds/ eggs/ reptiles (SV) and omnivorous (O) as described by Ali (2002), on the basis of IUCN (2001) status for the categorization of birds as least concern (LC) and on the basis of preferred habitat as agricultural field area (A), tree plantation area (B) and residential/ roadside area (C).

RESULTS AND DISCUSSION

A total of 45 bird species were recorded out of which 40 bird species were found at study area A and B and 34 bird species were recorded at study area C.

Study area A and B supported maximum bird species which might be due to the presence of greater tree diversity. It had widespread agricultural lands and tree plantation/ forest/ orchard conditions. Mariappan et al. (2013) stated that majority of the birds depend upon their food from the agricultural and tree plantation areas. Easy food availability might be the reason of less interspecies competition observed at study area A and B. On the other side, study area C was recorded with least species diversity which might be due to area more inhabited by man.

The Asian koel showed maximum abundance at study area C (2.66%) followed by B (2.04%) and A (1.00%) which might be due to the presence of its host house crow which was maximum at study area C (25.12%) followed by A (25.05%) and B (20.08%). This can be reasoned due to the presence of greater opportunities of food due to human habitation. Therefore, difference in abundance from C to A of Asian koel was recorded as 1.66% (Table 1). It was also due to the fact that the variety in food items was greater at residential/ roadside area and tree plantation area for Asian koel as compared to agricultural field area. Also different types of vegetation of fruits and berries were present at B and C as compared to study area A. Researchers like Cushing et al. (2018) also stated that the factors like distribution, abundance and composition of bird species are often associated with gradients like vegetation cover and habitat availability. It was also found that despite of lowest species richness at C, the species like common moorhen, little brown dove, little egret and white wagtail were only known to be found at C and not at A and B. On contrary, species like Asian pied starling, black-winged stilt, barn swallow, house sparrow, Indian roller, paddy field pipit, pied bushchat, spotted munia, white-breasted kingfisher and white-breasted waterhen were known to be found at A and B and were absent at C. Not only this, bank myna was the only species that was found only at study area A.

The maximum annual relative abundance was that of house crow at all the study areas while the minimum annual relative abundance was of pied bushchat at A (0.09%) and B (0.14%) and of common moorhen at C (0.04%). The Mann-Whitney U test carried out to compare the relative abundance of bird species observed at all the locations gave Non-significant difference between relative abundance between study areas A and B, B and C and A and C at 5% level of significance. The foraging and feeding activities of Asian koel showed that it forages for the whole day irrespective of the

daytime temperature. Adult koel was mainly observed to feed on trees with fruits. It was noted that it hopped from one branch to another, plucked the fruit and ate it. Sometimes two Asian koels were also observed to forage on the same tree. The observations on percentage of feeding items preferred by Asian koel were recorded and found that a total of five feeding items viz. nectar, seeds, fruits and berries, insects and dead animals were consumed by Asian koel. The data depicted that all types of food items were consumed by Asian koel in study area B and C. The percentage of fruits and berries consumed was highest as compared to the other food items at all the study areas and this might be due to the presence of tree diversity whereas it was less seen to feed upon dead animals which might be due to the reason that adult Asian koel feed mainly on fruits and only nestlings take protein rich dead arthropods as said by Corlett and Ping (1995). In addition to this, workers like Payne (2005) also recorded that Asian koel feeding habits consisted mostly of fruits especially nutmegs and banyan figs, insects, snail, flower and nectar. Not only this, he also observed Asian koel to feed upon eggs of other birds like bulbul and took small birds. Therefore, the present study and study by Payne in 2005 revealed almost same feeding habit of Asian koel.

The study on roosting behavior of Asian koel at different tree species was also done. The communal roosting in Asian koel was recorded on different tree species in different study areas. The roosting sites observed were directly proportional to the tree diversity present in that area. The roosting behavior of Asian koel was recorded high at some places whereas it was seen very low at some other places. It was also observed that they change their roosting site from one place to another within the same area. The roosting behaviour in study areas and on trees are given in Table 2. The maximum number of roosting sites i.e. 20 were observed at study area C followed by study area B and A with 15 and 6 roosting sites respectively. Tree species like dhok, neem, peepal, purple bauhinia and safeda were mainly utilized as roosting sites at all the study areas as compared to golden rain tree, jacaranda, kanak champa, kassod, mango, plum, satpatia, silver oak, tamarind and white mulberry tree species that were least utilized. The present study revealed that the more number of roosting sites might be due to presence of human habitation and abundance in tree species as compared to other study areas. Whereas Begum et al. (2011) in their work showed that Asian koel roosts mainly upon fruit trees and recorded trees like *Ficus bengalensis*, *Psidium guajava*, *Ficus racemosa*, *Syzygium jambos*,

Table 1. Annual abundance and other details of Asian koel

S. No.	Bird species (Common name)	Bird species (Scientific name)	Annual abundance			Food	IUCN status	Habitat type
			A	B	C			
1	Asian koel	<i>Eudynamis scolopaceus</i>	1	2.04	2.66	I, F	LC	ABC
2	Asian pied starling	<i>Sturnus contra</i>	2.56	2.91	-	I, F	LC	AB
3	Bank myna	<i>Acridotheres ginginianus</i>	5.35	-	-	I, F	LC	A
4	Barn swallow	<i>Hirundo rustica</i>	2.2	2.99	-	I	LC	AB
5	Black drongo	<i>Dicrurus macrocercus</i>	1.93	1.31	1.11	I	LC	ABC
6	Black kite	<i>Milvus migrans</i>	5.1	3.21	5.42	I, R	LC	ABC
7	Black-winged stilt	<i>Himantopus himantopus</i>	0.63	0.7	-	I	LC	AB
8	Brown rock chat	<i>Cercomela fusca</i>	-	0.25	0.18	I	LC	BC
9	Cattle egret	<i>Bubulcus ibis</i>	2.91	2.59	0.7	I, SI	LC	ABC
10	Common hoopoe	<i>Upupa epops</i>	0.27	0.35	0.45	I	LC	ABC
11	Common moorhen	<i>Gallinula chloropus</i>	-	-	0.04	I, SI, G, P	LC	C
12	Common myna	<i>Acridotheres tristis</i>	4.61	9.87	12.53	I, F	LC	ABC
13	Coppersmith barbet	<i>Megalaima haemacephala</i>	0.15	0.27	0.09	I, F	LC	ABC
14	Eurasian collared dove	<i>Streptopelia decaocto</i>	2.98	3.72	4.08	G	LC	ABC
15	Greater coucal	<i>Centropus sinensis</i>	1.5	1.43	1.56	I, SI, SV	LC	ABC
16	Green bee-eater	<i>Merops orientalis</i>	2.69	4.42	0.72	I	LC	ABC
17	Grey francolin	<i>Francolinus pondicerianus</i>	1.12	1.56	0.11	G, I	LC	ABC
18	House crow	<i>Corvus splendens</i>	25.05	20.08	25.12	O	LC	ABC
19	House sparrow	<i>Passer domesticus</i>	0.5	0.57	-	G, I	LC	AB
20	Indian black ibis	<i>Pseudibis papillosa</i>	0.97	0.69	0.94	G, I	LC	ABC
21	Indian grey hornbill	<i>Ocyrceros birostris</i>	0.67	0.81	1.14	F, I	LC	ABC
22	Indian peafowl	<i>Pavo cristatus</i>	0.72	1.93	0.72	G, P, I, SV	LC	ABC
23	Indian roller	<i>Coracias benghalensis</i>	0.19	0.2	-	I	LC	AB
24	Jungle babbler	<i>Turdoides striatus</i>	5.74	6.24	9.78	I, F	LC	ABC
25	Lesser golden-backed woodpecker	<i>Dinopium bengalensis</i>	0.21	0.34	0.35	I	LC	ABC
26	Little brown dove	<i>Streptopelia senegalensis</i>	-	-	1.99	G	LC	C
27	Little egret	<i>Egretta garzetta</i>	-	-	0.07	I, SI	LC	C
28	Oriental magpie-robin	<i>Copsychus saularis</i>	0.49	0.56	0.79	I	LC	ABC
29	Paddy field pipit	<i>Anthus rufulus</i>	2.12	0.82	-	I, P	LC	AB
30	Pied bushchat	<i>Saxicola caprata</i>	0.09	0.14	-	I	LC	AB
31	Purple sunbird	<i>Nectarinia asiatica</i>	0.49	0.87	1.1	P	LC	ABC
32	Red-vented bulbul	<i>Pycnonotus cafer</i>	2.43	1.97	2.55	I, P, F	LC	ABC
33	Red-wattled lapwing	<i>Vanellus indicus</i>	3.25	2.9	4.4	I, SI	LC	ABC
34	Rock pigeon	<i>Columba livia</i>	5.04	8.6	7.46	G	LC	ABC
35	Rose-ringed parakeet	<i>Psittacula krameri</i>	5.46	5.52	8.77	F, P, G	LC	ABC
36	Rufous treepie	<i>Dendrocitta vagabunda</i>	0.74	0.68	0.65	I, SV	LC	ABC
37	Shikra	<i>Accipiter badius</i>	1.06	1.61	0.99	I, SV	LC	ABC
38	Spotted munia	<i>Lonchura punctulata</i>	4.26	0.3	-	I, G	LC	AB
39	Spotted owl	<i>Athene brama</i>	0.3	0.39	0.22	I, SV	LC	ABC
40	White wagtail	<i>Motacilla alba</i>	-	-	0.1	I, SI	LC	C
41	White-breasted kingfisher	<i>Halcyon smyrnensis</i>	0.51	0.46	-	I, SV	LC	AB
42	White-breasted waterhen	<i>Amaurornis phoenicurus</i>	0.35	0.8	-	I, SI, G, P	LC	AB
43	White-throated munia	<i>Euodice malabarica</i>	0.58	0.28	0.58	G, P	LC	ABC
44	Wire-tailed swallow	<i>Hirundo smithii</i>	3.12	4.39	0.11	I	LC	ABC
45	Yellow-legged green pigeon	<i>Treron phoenicoptera</i>	0.68	1.24	2.53	F	LC	ABC

Table 2. Roosting sites of Asian koel

Tree species	Study area		
	A	B	C
Amaltas	x	√	√
Ashoka	x	√	√
Banyan	x	√	√
Dhek	√	√	√
Golden rain tree	x	x	√
Gulmohar	x	√	√
Indian gooseberry	x	√	√
Ipil-Ipil	√	√	x
Jacaranda	x	x	√
Kanak Champa	x	x	√
Kassod	x	x	√
Mango	x	√	x
Neem	√	√	√
Peepal	√	√	√
Plum	x	x	√
Purple Bauhinia	√	√	√
Safeda	√	√	√
Satpatia	x	x	√
Silver Oak	x	x	√
Spotted Fig	x	√	√
Tahli	x	√	√
Tamarind	x	√	x
White mulberry	x	x	√
Total	6	15	20

√: utilized as roosting site by Asian koel; x: not utilized as roosting site by Asian koel

Eugenia javanica, *Zizyphus mauritiana*, *Carica papaya* and *Polyalthia longifolia*. Therefore both the studies showed some variations in roosting sites of Asian koel. Therefore, the results regarding abundance, feeding and roosting sites of Asian koel revealed that it preferred areas mainly with good tree diversity. The presence of human habitation and abundance of house crow which act as a host for Asian koel, was some key priority areas for the Asian koel. The coevolution of host parasite relationship turn this study towards its future perspectives that can mention the evolutionarily interspecific dependence of Asian koel with house crow and other host species for its breeding (Jayadevan and Lowther, 2020).

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AUTHOR CONTRIBUTION STATEMENT

The designing of the research problem was done by M K and the execution and observations were made by M.J. Both the authors interpreted the data. M J wrote the manuscript and M K read and approved the manuscript.

CONFLICT OF INTEREST

No conflict of interest.

REFERENCES

- Ali S. 2002. The Book of Indian Birds. Oxford University Press, Bombay.
- Begum S, Moksnes A, Roskraft E, Stokke B G. 2011. Factors influencing host nest use by the brood parasitic Asian koel (*Eudynamys scolopacea*). Journal of Ornithology 152(3): 793-800.
- Choudhary V. 2020. Asian koel (*Eudynamys scolopacea*) complete detail. Abhinav Nature Conservation. <http://natureconservation.in/asian-koel-eudynamys-scolopacea-complete-detail/18.12.2022>.
- Corlett R T, Ping I K W. 1995. Frugivory by koels in Hong Kong. Journal of Memoirs of the Hong Kong Natural History Society 20:221-222.
- Cushing D A, Roby D D, Irons D B. 2018. Patterns of distribution, abundance and change over time in a subarctic marine bird community. Deep-Sea Research Part II 147:148-163.
- IUCN. 2001. IUCN red list categories and criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.
- Jayadevan P, Jayapal R, Pittie A. 2016. A checklist of the birds of India. Journal of Indian Birds 11(5&6): 113-172.
- Jayadevan P, Lowther P. 2020. Avian brood parasitism in South Asia. Journal of Indian Birds 16(4): 103-119.
- Khan A A, Qureshi I Z. 2020. High-level individuality in vocalizations of well-known avian brood parasite: Asian koel *Eudynamys scolopacea* L.). Journal of Bioacoustics 30(1): 1-10.
- Kler T K, Kumar M. 2015. Avian fauna in agricultural habitats of Punjab state. J of Agricultural Research 52(3): 83-90.
- Limparungpatthanakij W. 2020. Asian koel *Eudynamys scolopacea*. Version 1.0. Birds of the world. The Cornell lab of Ornithology.
- Mariappan N, Kalfan B K A, Krishnakumar S. 2013. Assessment of Bird Population In Different Habitats of Agricultural Ecosystem. International Journal of Scientific Research in Environmental Sciences 1(11): 306-316.
- Nahid M I, Begum I S, Feeroz M M. 2016. Brood parasitic cuckoos and their hosts in Jahangirnagar University campus. Journal of Indian Birds 12(2&3): 64-69.
- Payne R B. 2005. The Cuckoos. Oxford University Press.

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