

FEEDING ECOLOGY OF INDIAN COURSER *Cursorius coromandelicus***S. B. MUNJPARA^{a1} AND I. R. GADHVI^b**^aSenior Research Fellow, GEER Foundation, Indroda Park, Gandhinagar, Gujrat, India^bDepartment of Marine Sciences, Bhavnagar University, Bhavnagar, Gujrat, India**ABSTRACT**

Endemic species are ecologically significant because they have very less chance to recover if they are under the threats since they obtain limited ranges, and not found anywhere else within the world. Indian Courser is one of the species of Indian Sub-continent that has not been explored much and disappearing from its natural habitats threat. The species was found to be ground feeding bird and diurnal (n=1,086 under observation for feeding activity). With feeding activity birds also spent time for movement, scanning, vigilance and other activities. Feeding was about 48% in daytime (SD = ±20). Foraging habitats were mainly sparse grassland (O= 27.3%, n=1,315 birds) and open-land (O= 27.2 %, n=1,309), followed by and fallow-land (O= 26.7%, n=1,285) and saline grassland (O= 18.2 %, n= 876). Average dry weight of singledropping of the species was obtained 287mg Mean (SD = ± 119.56, SE= ± 20.81) and major food items comprised of arthropods such as Isoptera (termites), Hymenoptera (ants, big ants) Coleoptera (beetles), Hemiptera (bugs) and Embioptera.

KEYWORDS : Feeding behavior, Foraging habitat, Diet composition

Nowadays, many ecosystems and natural habitats are being converted very fast into industrial settlements, cropland and urban development. Such globalizing actions cause fragmentation, isolation and degradation of potential and ecologically important ecosystems and habitats including one of the most fragile ecosystems on the earth i.e. Grassland ecosystem. Grassland is being affected due to agricultural practices, grazing pressure, developmental activities and plantation of trees. Invariably, birds are one of the indicators of such inauspicious activities in any ecosystem. In addition, negative impact of such activities can also be seen very rapidly on endemic as well as breeding birds of those habitats, because they obtain limited ranges, and not found anywhere else within the world. Therefore, they have less chance to recover. There are very few studies on the endemic birds of India (Jathar and Rahmani., 2006).

Indian Courser (*Cursorius coromandelicus*) is an endemic and resident bird species of arid and semiarid area of the Indian Sub-continent. It is quite common but rather patchily distributed in their distribution range. They are also partly nomadic and locally migrant (Balachandran, 1994; Ali and Ripley, 2001). They generally inhabit in waste and fallow land with scattered scrub, ploughed fields, and village grazing grounds of dry stony plains and Deccan plateau country. It avoids areas of heavy rainfall as well as pure desert (Ali and Ripley, 2001). They are not found on coast. Based on the availability of the literature, Indian Courser is one of the species of India, which is very less

explored. Most of the times this species is recorded during birding activities in India but it have not received any serious attention as the subject matter of ecological exploration and also from the conservation point of view. The species is believed to disappearing very fast from its natural habitat in Gujarat and other parts of the country (Pande al., 2003; Munjpara and Gadhvi 2009). Being an endemic species, it has limited distribution ranges. Thus, threats such as habitat destruction would critically affect the existence of the species in wild. The little explored Indian Courser is being vanished in some region of the country. Thus in the present study, feeding ecology of the species was undertaken in Abdasa Taluka of Kachchh District in Gujarat.

Study Area

The study was conducted in Abdasataluka of Kachchh District. It is situated in the southwestern province of Kachchh District, Gujarat (Figure, 1). Climatic condition of the area is arid and semi arid type. Almost all precipitation occurs during southwest monsoon, which begins at end of June and continues till mid-September. In summer, maximum temperature ranges between 40°C-45°C and in winter minimum temperature goes below 5°C. The habitat in the study area comprises of scrubland, grassland, agriculture land and saline mudflat. It falls under ecological zone 5A/DS 4- Dry grassland with few scattered patches of 5A/DS 2- Dry Savannah (Champion and Seth, 1968). Major agricultural crops are groundnut and cotton; other minor crops are Millet (*Penisitam typhodies*), Sesamum

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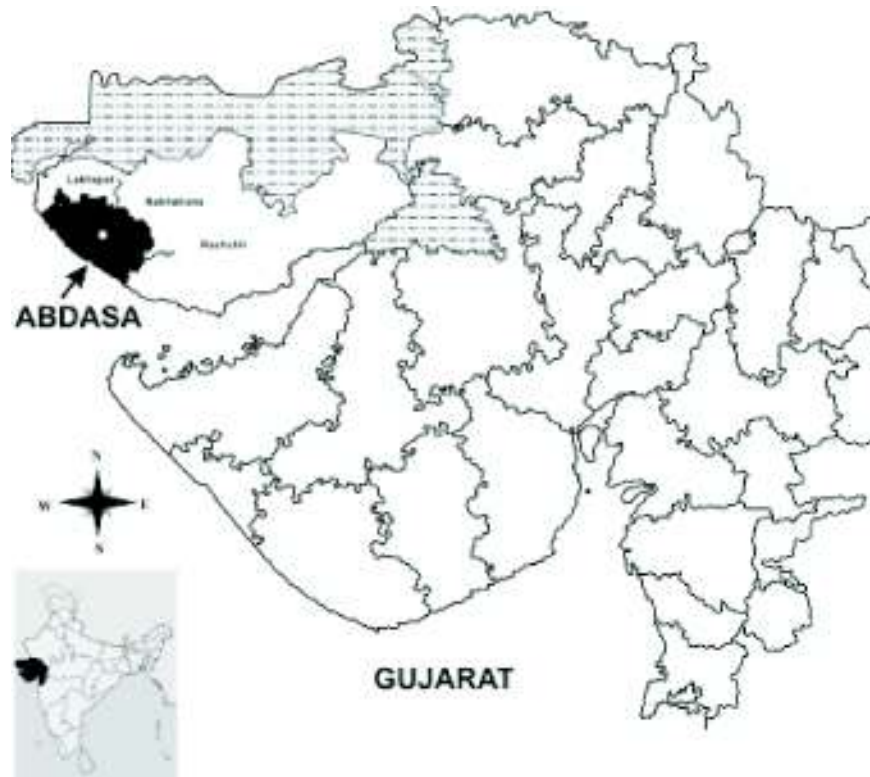


Figure 1: Map of the Study Area [Abdasa Taluka, Southwestern Province of Kachchh District, Gujarat, India]

(*Sesemum indicum*) etc. One of the significant grassland of Gujarat State is also in this area, Naliya Grassland. The grassland is dominated with grass genera like *Cymbopogon*, *Aristida* and *Dichanthium* etc. and *Acacia*, *Zizyphus*, *Prosopis* etc. are major shrub/tree species (Meena et al., 2005; Munjpara et al., 2011). Major habitat types in the area are Grassland, Scrubland, Open land, permanent and temporary water bodies. However some patches of dense *Prosopis juliflora* and planted shrub-cover also exist.

METHODOLOGY

Overall period of field data collection to explore feeding ecology of Indian Courser was from January 2007 to March 2010. During this period, feeding behavior, feeding items and dropping analysis were carried out. The detailed methodology has been given below:

Feeding Behavioral

The foraging behavior of birds was observed in different time blocks of the days throughout the fieldwork, these time blocks were taken in such a way that at the end, feeding ecology of the species could be known of entire

daytime. Individual birds were observed through pair binoculars (10X50) and type of foraging habitat, foraging time, foraging substrate (the material from which food is taken by the birds - classified into air, ground) and foraging method were also noted.

Food Items

After observing feeding of birds through binocular (10X50), on-site inspection of food material was made to identify food items. Insects were collected and identified. Moreover, food items were also studied through stomach content. To explore the food items of any bird species the major source is stomach contents (Ralph et al., 1985). There were various methods to collect the stomach content like killing of specimens but it was undesirable, use of agents that make vomiting but it could cause stress and even kill the bird food from the nest but it was possible in limited seasons (Prey-Jones et al., 1974; Radke and Frydendall 1974). Thus, dropping analysis was carried out to find out the food, feeding ecology and quantitative description of food items of Indian Courser. Series of the methods used for determination of food items of Indian Courser have been

given below:

Collecting and Storing of Droppings

Collection of dropping was carried out from the field. These collections were made in all seasons as well as in each field visits. To remove the bias between dropping of Indian Courser and other species, fresh specimens of the dropping were collected. Fresh dropping were semi solid therefore to pick up them with hand was not easy. Therefore fresh dropping were collected through hard paper as well as with direct hand picking if it could be possible. After removing sand particles which always comes with dropping, it was put in clean, labeled paper bag. In the label, some information like date of collection, area and habitat, place and localities were noted down. Paper bag of each field visit put in a plastic bag with some naphthalene boles that make it protected from fungal infection then all those dropping further taken under laboratory analysis for effectively and quickly break down of a large number of droppings individually so that the contents would be well dispersed and easily viewed.

Droppings Analysis

Dropping analysis was carried out in laboratory. The sample was diluted in water, then it was centrifuged to separate various particles from it.

After performing centrifugation various particles were removed. By performing three treatments of

centrifugation the dropping material taken on slide and observation carried out the find out the food item of the species. Further, some material like insect parts separated out and permanent slides were prepared and photographs were taken.

RESULTS

Foraging behavior of Indian courser is ground feeding. It was observed gleaning ground for food. Feeding activity was mainly during daytime (n=1,086 under observation for feeding activity). Feeding activity started within one hour after sunrise up to before two hours to the sunset, in between, the activity was remained continue. Feeding activity was not constant, with the feeding activity; birds were also spending time for movement, scanning, vigilance and other activities. But feeding was about 48% of daytime (SD =±20). Feeding activity varied during daytime and was higher in the morning (43.8 ± 5.48 %), noon and afternoon (29.5 ± 2.64 %) than that of evening (26.7 ± 2.48 %).

Feeding Behavior of The Species

While feeding, bird was scratching the ground with beak and then took the food and then run at another place. According to Ali and Ripley (2001) the species runs swiftly in short spurts and dipping forward, characteristic plover style to pick some insect. Similar kind of feeding

Table 1: Insects Observed at Feeding Ground as Well as in Dropping of Indian Courser

Sr. No.	Species	Order-Family	Species
From Ground			
1	Big Ant	Hymenoptera- Apididae	Unidentified
2	House Cricket	Orthoptera- Acredidae	Unidentified
3	Beetle	Colioptera- Cerembycidae	Unidentified
4	Beetle	Coleoptera-Coccinellidae	<i>Cheilomenes sexmaculata</i>
5	Beetle	Coleoptera-Cicindelidae	<i>Cicindelaqua drilineata</i>
6	Beetle	Coleoptera-Lampyridae	Luciola sp.
7	Ants	Hymenoptera- Formicidae	Unidentified
8	Ants	Hymenoptera- Formicidae	Unidentified
From Dropping			
9	Big Ant	Hymenoptera	Unidentified
10	Ants	Hymenoptera	Unidentified
11	Beetle	Coleoptera	Unidentified
12	Many unidentified particles	Unidentified	Unidentified

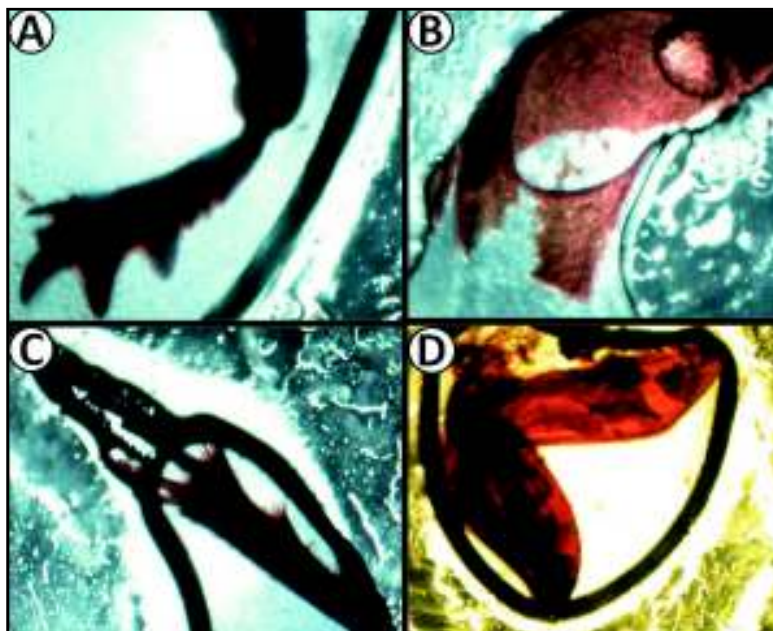


Figure 2 : Residual of Insect's Body Parts Obtained From Droppings of Indian Courser

behaviour was observed in the present study. It was not observed following or chasing the food.

Foraging Habitat

Most of the time the bird was observed foraging in sparse grassland (O= 27.3%, n=1,315 birds) and open-land (O= 27.2 %, n=1,309), followed by and fallow-land (O= 26.7%, n=1,285), saline grassland (O= 18.2 %, n= 876) and occasionally in other habitats. The birds were recorded

taking food from the ground, grass root and from clumps of grasses its foraging habitat. The foraging habitat was mainly composed of following plant species: *Cymbopogon martinii*, *Dichanthium annulatum*, *Aristida adenensoides*, *Acacia senegal*, *Zizyphus numularia*, *Urochondra setulosa*, *Fagonia cretica*, *Glossocerdia bosvellia* and *Chrysopogon fulvus*. The area where the species had scratched foraging ground, it had devoured the colony of termites.

Availability of Prey Items

The foraging ground was carefully studied immediately after the bird has left the area, mostly, arthropods were observed such as Isoptera (termites), Hymenoptera (ants, big ants) Coleoptera (beetles), Hemiptera (bugs) and Embioptera.

Composition of Diet

Average dry weight of single dropping of the species was obtained 287mg Mean (SD = ± 119.56, SE = ± 20.81, Confidence interval at 95% is 5.94). It was ranging from 536mg to 71mg. The beak of the species is insectivore type perfectly adapted to catch an insect in their jaws. The diet mostly composed of insects mainly belongs to Coleoptera and Hymenoptera as well as many unidentified (Figure, 2)(Table, 1).

DISCUSSION

Based on the classification of feeding method of birds by Bell and Ford (1990); Asokan(1995); Gokula(2001), the species can be considered as ground feeding bird (the bird picked prey from the ground) unlike aerial feeding (a bird flew into air to catch flying prey) and gleaning (a stationary food item is picked from its substrate by a standing or hopping). Ali and Ripley (2001) and Dharmakumarsinhji (1955) have also mentioned similar feeding behaviour of Indian Courser. Moreover, most of the activities of the species were observed during daytime which reveals that the species is diurnal in nature.

Results of the present study supports the observations of Ali and Ripley (2001) that species feeds chiefly on insects. Due to busted parts of insects in the droppings analyzed, the identification of insects consumed could not be possible upto its species level. However, based on the some peculiar characters of the insects, the food items could be identified only up to certain level. The important observation of food items is insects having chewing type of mouth parts. Moreover, same types of insects were also observed in feeding ground.

Chewing type of mouth parts and presence of mandibles is characteristic of insect that feed mainly vegetations (Howard et al., 2001). During observation on feeding ecology of the species, birds were found to be

taking/searching food from the root of some vegetation species such as *Cymbopogon martinii*, *Dichanthium annulatum*, *Aristida adenensoides*, *Acacia Senegal*, *Zizyphus numularia*, *Urochondra setulosa*, *Fagonia cretica*, *Glossocercia bosvellia* and *Chrysopogon*. Sparse grassland, open-land, fallow-land and saline grassland provide food availability as well as visibility to the birds. Hence, those habitats were major foraging habitat of Indian Courser.

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