

Food and feeding behaviour of Chestnut-tailed Starling, *Sturnia malabarica* at Jahangirnagar University Campus, Bangladesh

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Abstract

Food and feeding behaviour of Chestnut-tailed Starling, *Sturnia malabarica* were studied at Jahangirnagar University Campus, Bangladesh, from August 2016 to March 2017. A total of 414 observations were made on the feeding maneuver and it was noted that they were omnivorous consuming 67.15% animal diet compared to 20.53% plant diet. They predominantly consumed insect larvae (39%) followed by beetles (16%), nectar (14%), food wastes (12%), fruits (7%), dragonflies (7%), damselflies (3%), and worms (2%). Among the five types of feeding modes recorded, hang-up mode (37.92%) was major feeding technique in Chestnut-tailed Starling while pecking mode (6.76%) was least used. Rain tree (*Samanea saman*) (33.76%) followed by White siris (*Albizia procera*) (30.55%) was recorded as the most utilized foraging plant while mostly preferred perching height by Chestnut-tailed Starling was 6-9m (44.9%) followed by 3-6m (31.6%).

Key words: Chestnut-tailed Starling, *Sturnia malabarica*, food and feeding, JU campus

INTRODUCTION

Diet plays fundamental role in bird's life history and constitutes the basic ecology of a species (Duraes & Marini, 2003). Studies on the feeding ecology of birds is important to understand community structure, resource use pattern and their co-existence in a particular habitat (Asokan & Ali, 2010; Kaur & Kler, 2018). Knowledge on feeding habit helps to identify the habitat characters and determine the status of the species and ecosystem. It also provides necessary information for the conservation and management of species and ecosystems (Asokan & Ali, 2010).

Sturnidae (Starlings & Mynas), a common song bird family, is widely distributed throughout the world. They are well known as bio-controlling agents in agricultural world and have been introduced in many countries (Craig & Feare, 2010). Bangladesh is the home of 12 species of sturnids including Chestnut-tailed Starling (*Sturnia malabarica*) (Khan, 2018). They occupy similar habitats throughout the country. Due to having diverse habitats like permanent water bodies (artificial lakes and ponds), marshy areas, woodlands, grasslands, bushes, cultivated lands etc., Jahangirnagar University Campus (JUC) is rich in bird species. Chestnut-tailed Starling is very common here and shares the same feeding and breeding habitat with three other sturnid species – Common Myna (*Acridotheres tristis*), Jungle Myna (*Acridotheres fuscus*) and Asian Pied Starling (*Gracupica contra*) (Begum, 2006; Mohsanin & Khan, 2009).

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Despite being common resident species, biology of Chestnut-tailed Starling is not well documented and detailed studies on the feeding ecology is still scarce in Bangladesh. Very little is known about feeding habits of this species from previous studies (Begum, 2006; Jaman & Sahreen, 2004). Hence, the present study was conducted to investigate the food and feeding behavior of Chestnut-tailed Starling at JUC with special reference to dietary preference, feeding modes, foraging plants and perching height preference.

MATERIALS AND METHODS

Study area: The study was conducted between August 2016 and March 2017 at Jahangirnagar University Campus. It is situated at 32 km north of Dhaka city (23°88'N and 90°26'E) and is about 700 acres in area. The climate of this area is characterized by three main seasons: summer (March to May), monsoon (June to October) and winter (November to February).

Food and feeding data: Data on food and feeding behaviour of Chestnut-tailed Starling at JUC were collected through direct observation. A total of 173 hours was spent at the study area for data collection and only birds with confirmed food items were recorded. Individual birds were observed systematically and their diet, feeding modes, foraging plants and perching heights (height at which the bird perched while feeding) were noted carefully. Feeding modes of *S. malabarica* were classified into following five categories (Remsen & Scoot, 1990).

Hang-up: Hanging on vertical or horizontal substrate, including acrobatic movements, with head up.

Hang-down: Hanging on vertical or horizontal substrate, including acrobatic movements, with head down.

Gleaning: Picking food item from a nearby substrate, including the ground, without extending legs and neck completely.

Pecking: Driving the beak against the substrate to remove some of the exterior of the substrate.

Aerial: Flying into air to catch flying prey.

Perching heights were grouped into four categories: 0-3m, 3-6m, 6-9m and 9-12m. The heights of the plants were visually estimated (Narayana *et al.*, 2014).

Food items consumed by Chestnut-tailed Starling were identified through direct observation. A pair of binoculars (Bushnell, 8x42mm) and photographs taken by Canon 700D/55-250 camera were used to identify the food items those could not be identified by naked eyes particularly the flying insects and the food items of higher canopy.

From the data collected we determined and calculated percent use of food items and different foraging variables used by Chestnut-tailed Starling. The chi-square test was used to determine whether there are significant variations in monthly utilization of food items by Chestnut-tailed Starling.

RESULTS AND DISCUSSION

Food items: A total of 414 observations were made on food and feeding behaviour of Chestnut-tailed Starling at JUC. They were omnivorous and the diet constituted 67.15% animal matter, 20.53% plant matter and 12.32% food wastes. Animal diets included both larval and adult forms of insects, and worms while plant diets included fruits and nectar (Fig. 1). Based on the observations, insect larvae (39%) were predominant food items consumed by Chestnut-tailed Starling followed by beetles (16%), nectar (14%), food wastes (12%), fruits (7%), dragonflies (7%), damselflies (3%), and worms (2%) (Fig.1). It was observed that insect larvae constituted 57.91% of animal diet. This may be due to the availability of diverse group of insects particularly butterflies at the study area and easy access of birds to inactive larval form. Jaman & Sahreen (2004) and Begum (2006) also reported insects as major animal diet of Chestnut-tailed Starling. Among the plant diets, Chestnut-tailed Starling preferred nectar over fruits. However, monthly utilization of food items did not differ significantly ($\chi^2=64.14$, $P>0.05$, $df=49$) (Fig. 2). Consumption of insect larvae was consistently highest throughout the study period except in February. In February, the birds were mostly found to consume nectar as many flowers were in bloom at this time. Many factors like seasons, weather, availability of food, breeding season and interspecific competition influence the foraging behaviour of birds (Kelly, 1998; Gokula & Vijayan, 2007; Asokan & Ali, 2010). It is worth mentioning that during the study period, monthly average temperature at JUC ranged between 21°C and 30°C whereas monthly average humidity varied from 56.66% to 88.92%. Average highest rainfall was recorded in August (87mm) while no rainfall was recorded in December, January and February (Source: Department of Department of Geography and Environment, Jahangirnagar University).

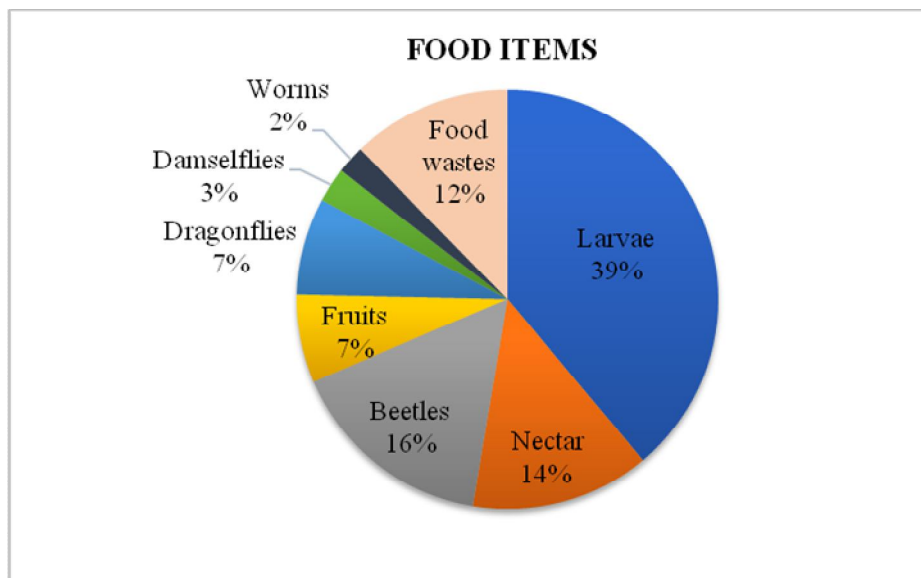


Fig. 1. Proportions of different food items consumed by Chestnut-tailed Starling at JUC (N=414)

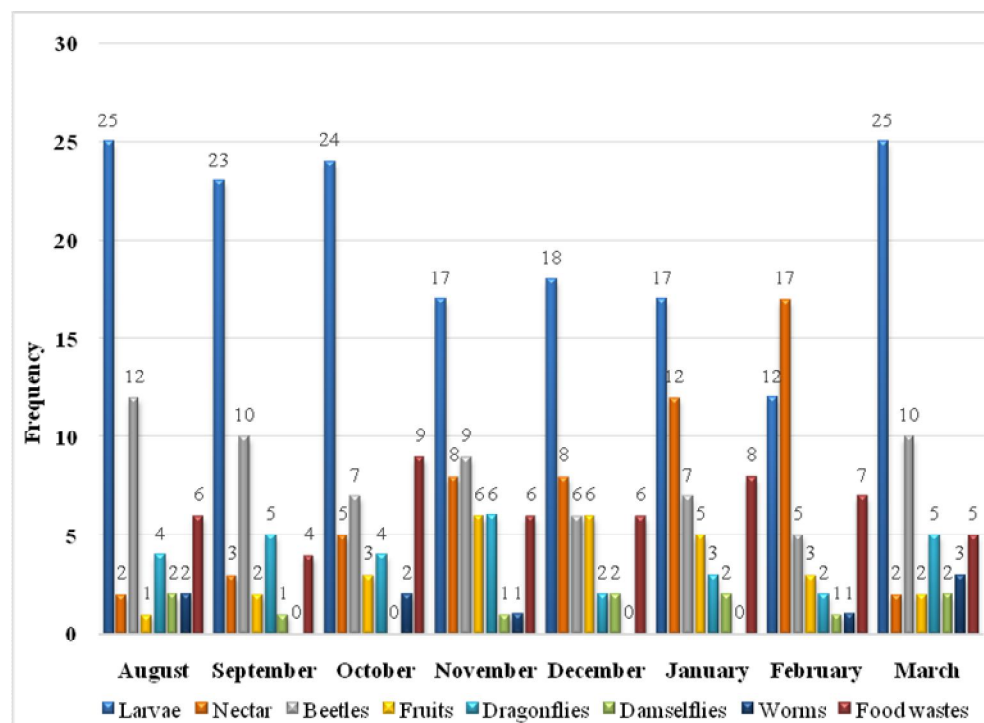


Fig. 2. Monthly variations in utilization of different food items by Chestnut-tailed Starling at JUC (N=414)

Modes of feeding: In present study, five types of feeding modes of Chestnut-tailed Starling were recorded. Among them, the starlings mostly used hang-up (37.92%) mode followed by hang-down (30.43%) whereas pecking mode was least used (6.76%) (Fig. 3). Hang-up and hang-down were mainly used to capture insect larvae and also to take flower nectar. This species particularly captured the larvae by hanging down when a larva was under the leaf or stem or branch. Aerial mode (11.35%) was used to capture the flying insects like dragonflies and damselflies. Pecking mode was observed while taking insects from fruits and barks. Another important feeding method of Chestnut-tailed Starling was gleaning (13.53%). Some insects, fruits, and ground food such as food wastes and worms were taken by using this method. Gleaning is one of the major forms of feeding behaviour used by ground and foliage searching birds as gleaning has least rate of energy expenditure compared to the other behaviour (Remsen & Scott, 1990). However, Recher & Davis, 1998; Gokula & Vijayan, 2000; Murakami, 2002; Asokan & Ali, 2010 mentioned that the use of feeding technique of birds depends on the morphological characteristics of the species, on the habitat type and the availability of food items.

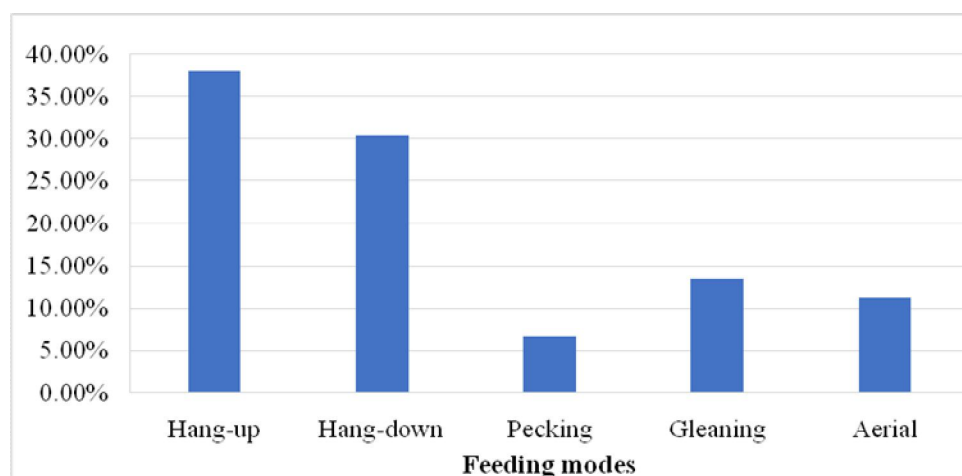


Fig. 3. Proportions of different feeding modes by Chestnut-tailed Starling at JUC (N= 414)

Foraging plants: Although there are a great variety of plants in Jahangirnagar University Campus (Hossain *et al.*, 1995), Chestnut-tailed Starlings were found to be selective in foraging. During the study period, they were observed to forage only ten species of plants (Table 1). Among them, the starlings mostly foraged on *Samanea saman* (33.76%) followed by *Albizia procera* (30.55%). These species were common in JUC and mostly foraged for insect larvae. *Ficus benghalensis* (12.54%) and *Madhuca indica* (1.29%) were mainly preferred for fruits while *Butea monosperma* (9.00%) was preferred for nectar. In February when *Butea monosperma* in full bloom, flocks of Chestnut-tailed Starling were often found to forage the trees for nectar. The previous study at JUC by Begum (2006) reported that Chestnut-tailed Starling consumed figs, berries and fruits of *Acacia* while no foraging behaviour of *S. malabarica* was recorded on *Acacia* in the present study.

Table 1. Plant species used by Chestnut-tailed Starling for feeding purposes at JUC

Common name	Scientific name	Family	Frequency of feeding (%)	Food items
Rain tree	<i>Samanea saman</i>	Fabaceae	33.76	Insects (larva or adult)
White siris	<i>Albizia procera</i>	Fabaceae	30.55	Insects (larva or adult)
Banyan	<i>Ficus benghalensis</i>	Moraceae	12.54	Fruits, Insects (larva or adult)
Flame of the forest	<i>Butea monosperma</i>	Fabaceae	9.00	Nectar
Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae	5.47	Insects (larva or adult)
Spanish cherry	<i>Mimusops elengi</i>	Sapotaceae	3.54	Fruits
Bengal almond	<i>Terminalia catappa</i>	Combretaceae	1.93	Fruits
Mahua	<i>Madhuca indica</i>	Sapotaceae	1.29	Fruits
Jujube	<i>Zizyphus mauritiana</i>	Rhamnaceae	0.96	Fruits
Black plum	<i>Syzygium cuminii</i>	Myrtaceae	0.96	Fruits

Perching heights: Chestnut-tailed Starling preferred mostly 6 to 9m perching height (44.9%) to collect their food while 3-6m (31.6%) was their next preference (Fig. 4). *S. malabarica* was chiefly arboreal and availability of food like insect larvae and flower nectar allowed the species to choose this height at JUC. The present study showed similarity with the findings of Jaman & Sahreen (2004) and Begum (2006). While Begum (2006) found that the Chestnut-tailed Starling was strictly arboreal feeder rather than ground feeder, Jaman & Sahreen (2004) reported that the species mainly found on upper canopy of the trees to feed on insects. Different species prefer to forage at different heights and it varies with regions depending on the habitat characteristics. Asokan & Ali (2010) reported that Common myna mostly forage on ground. Narayana *et al.* (2015) found that Black Drongo preferred a perching height of 9-12m in Nalgonda District of Andhra Pradesh, India while the study conducted by Asokan & Ali (2010) showed that Black Drongo fed at 0-6m in Nagapattinam District of Tamil Nadu, India. Sivakumaran & Thiyagesan (2003) found that Indian Roller preferred to perch at heights of 3-9m for locating the preys.

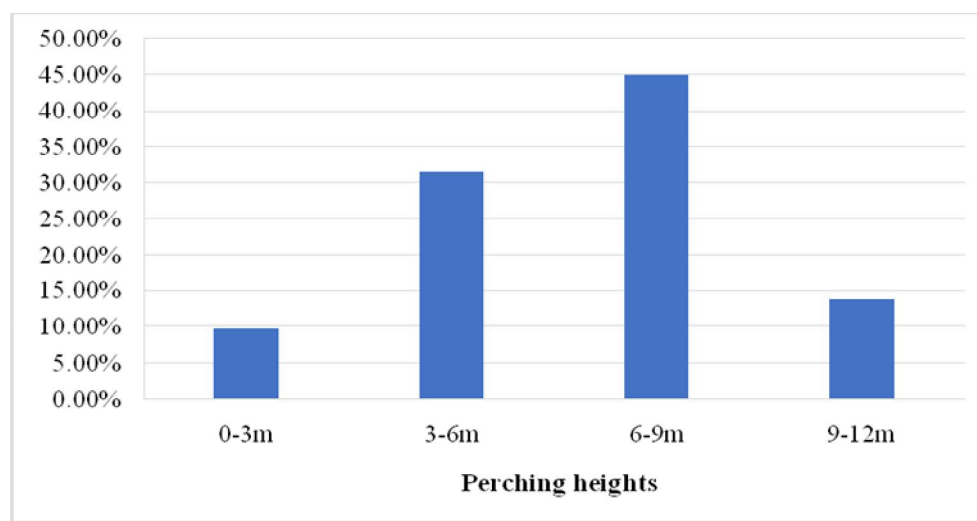


Fig. 4. Perching heights used by Chestnut-tailed Starling at JUC (N=414)

In conclusion, our findings demonstrate that Chestnut-tailed Starling was an omnivorous bird having insect larvae as staple diet, and thus playing an important role in ecosystem. In addition, they were predominantly arboreal feeder and large trees like Rain tree, white siris and Banyan were their major foraging plants. Therefore, protection and conservation of these trees at JUC is important for their survival. However, season and ambient temperature influence the feeding behaviour of birds (Asokan & Ali, 2010). The present study was mainly conducted in non-breeding season of the species. Study on feeding ecology of Chestnut-tailed Starling at JUC including their breeding season is recommended as the availability of food and energy expenditure during this time may result variations in the consumption of food and foraging behavior (Welty & Baptista, 1988; Hambly *et al.*, 2007).

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