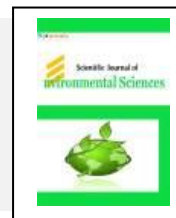


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Original article

Some breeding aspects of the indian roller coracias benghalensis, common myna acridotheres tristis and black drongo dicrurus macrocercus in Southern India

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ABSTRACT

We studied some breeding aspects of the Indian Roller, Common Myna and Black Drongo in Nagapattinam District of Tamil Nadu, India. The breeding activities of these species were recorded between March and August. We present here for the (a) nest tree characteristics, (b) nest characteristics, (c) clutch size, (d) egg dimensions, (e) incubation period, (f) hatching success and (g) fledging success of three species in the study area.

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1. Introduction

The Indian Roller *Coracias benghalensis* (Order: Coraciiformes, Family: Coraciidae) is the most common avian species in Southern India. It is a stocky bird about 26-27cm long and inconspicuous when resting. But, as it takes flight the primaries and secondaries show bright shades of blue (Rasmussen and Anderton 2005). During breeding season, the mates perform ornate sexual displays as they fly upward, then roll and fall through the air wildly flapping their wings and screaming harshly. This is how they earned the name roller. It inhabits all types habitat mainly in cultivation, thin forest and grassland and in cities at lower elevations but avoids heavy jungles. The distribution of Indian Roller extends across Iraq and Iran through Pakistan, India, Burma, Southeast Asia, Tibet and

parts of China (Ali and Ripley 1983). Relatively little is known about the behaviour the Indian Roller (Mathew et al. 1978; Panicker 1978; Sivakumaran and Thiyagesan 2003; Asokan et al. 2009a), so there are huge gaps in our knowledge about the ecology of the Indian Roller in India.

The Common Myna *Acridotheres tristis* (Order: Passeriformes, Family: Sturnidae) is a familiar urban bird. The common myna is readily identified by the brown body, black hooded head and the bare yellow patch behind the eye. The bill and legs are bright yellow. It is a species of bird native to Asia with its initial home range spanning from Iran, Pakistan, India, Nepal, Bhutan, Bangladesh and Sri Lanka; as well as Afghanistan, Tajikistan, Turkmenistan, Myanmar, to Malaysia, Singapore, peninsular Thailand, Indo-China and China (Ali and Ripley 1983). It is omnivorous and social in habit. Some information on its ecology is previously available (Anil et al. 1990; Anil and Bastawade 1991; Asokan et al. 2009b).

The Black Drongo *Dicrurus macrocercus* (Order: Passeriformes, Family: Dicruridae) is a small passerine bird belongs to the family Dicruridae. It is a common resident breeder in much of the tropical Southern Asia (Southwest Iran, India and Sri Lanka and Indonesia) (Ali and Ripley 1983). The Black Drongo is a wholly black bird with a distinctive forked tail. The Black Drongo is found predominantly in open country and usually perches and hunts close to the ground. They are mostly aerial predators of insects but also glean from the ground or off vegetation. Very few strip notes on ecological aspects of this species are available (Mathew et al. 1978; Shukkur and Joseph 1978; Chari et al. 1982; Vena and Loksha 1993; Ali et al. 2010).

This paper presents some information on nesting tree and nest characteristics, clutch size, egg dimensions, incubation period, hatching and fledgling success of the Indian Roller, Common Myna and Black Drongo in Southern India.

2. Materials and methods

The total height of the nesting tree and height of nest location (in meters) from the ground was measured using an altimeter. Diameter at breast height (DBH) was measured using a standard measuring tape. The length, width, circumference and depth of nests were measured by a meter scale or measuring tape (Ali et al. 2010).

The length and width of each egg was measured by Vernier Calipers with 0.1 mm accuracy. Each egg was weighed by a 100 g spring balance of 500 mg accuracy. The incubation period was determined as the time between the first egg laid and the first egg hatched. The eggs were numbered with a felt-tipped marker, for finding the hatching order of the eggs.

The hatching and fledging success were calculated by using the following formulas:

Hatching success (%) = (No. of eggs hatched / total no. of eggs laid) × 100

Fledging success (%) = (No. of nestlings fledged / total no. of nestlings hatched) × 100

2.1. Study area

The present study was conducted at in and around Mannampandal (11°18' N, 79°50' E), situated in the Nagapattinam District of Tamil Nadu, India. Agriculture is the major industry of this area, and contributes a high share of the rice production in the state. Sugarcane, groundnut, green gram, black gram, cotton, etc. are other major crops cultivated in the area. The river Cauvery and its tributaries are major perennial water sources used for irrigation. Woody vegetation is sparse in the form of groves and roadside trees. The predominant tree species found in the study area are *Cocos nucifera*, *Borassus flabellifer*, *Madhuca indica*, *Mangifera indica*, *Enterolobium saman*, *Tamarindus indicus*, *Ficus benghalensis*, *Ficus religiosa*, *Thespesia populnea*, *Acacia arabica*, *Odina wodier* and *Azadirachta indica*. Important shrub species are *Prosopis juliflora*, *Jatropha glandulifera* and *Adhathoda vesica*. Plantations of *Casuarina equisetifolia*, *Tectona grandis* and *Bamboosa arundinacea* are also found in the study area. Based on the north-east monsoon the study area is divided into four seasons, namely post-monsoon, summer, pre-monsoon and monsoon. Summer ranges from April to June (with mean maximum temperature of 38° C) and north-east monsoon starts between October and December. The cold season starts in November and may last until January.

3. Results

3.1. Indian roller

The breeding activities were recorded between March and June. Totally four nest-sites were observed, of which two were on Coconut trees *Cocos nucifera* and one each on Banyan tree *Ficus benghalensis* and Palm tree *Borassus flabellifer*. Mean height and DBH of the nesting tree was 10.7 ± 4.25 m (range: 6.5 - 15 m) and 43.5 ± 6.50 cm (range: 27 - 60 cm) respectively (Table 1).

Table 1

Nesting tree characteristics of the Indian Roller (n = 4), Common Myna (n = 34) and Black Drongo (n = 5) recorded in the study area.

Tree characteristics	Species	Range	Mean \pm SD
Tree height (cm)	Indian Roller	6.5 – 15.0	10.7 ± 4.25
	Common Myna	7.0 – 15.0	10.7 ± 1.98
	Black Drongo	7.0 – 25.0	14.5 ± 7.98
Nest location height (m)	Indian Roller	6.0 – 7.0	6.5 ± 0.50
	Common Myna	6.0 – 14.0	9.4 ± 1.90
	Black Drongo	6.0 – 13.0	8.0 ± 4.65
Tree DBH (cm)	Indian Roller	27.0 – 60.0	43.5 ± 6.50
	Common Myna	24.0 – 45.0	34.9 ± 4.59
	Black Drongo	30.0 – 75.0	43.5 ± 9.33

The Indian Roller is a secondary hole nester i.e. not capable of excavating its own nest and is dependent on natural tree holes or the abandoned nests of the primary hole nesters. No nest material was used by the Indian Roller in the nest holes. The hole length varied from 13 to 18 cm with a mean of 15.5 ± 1.14 cm, 28 to 32 cm in circumference with a mean of 25.0 ± 1.15 cm and 34 to 60 cm in hole depth and with a mean of 47.2 ± 5.58 cm.

Eggs were roundish oval, glossy white with rough texture. Mean length, width and weight of the eggs were 3.6 ± 0.18 cm (range 3.3 - 3.9 cm), 2.97 ± 0.14 cm (range 2.7 - 3.1 cm) and 13.81 ± 0.87 g (range 12 - 15 g) respectively. The clutch size varied from 3 to 4 (3.67 ± 0.57) (Table 2). The incubation period varied from 18 to 20 days and both parents incubated the eggs.

The Indian Roller laid totally 14 eggs, of which 9 hatched (64.2%) and 6 flew out the nest, making the fledging success 66.6% (Table 3).

3.2. Common myna

In general, the Common Myna breeds throughout year and in the present study most of the nests were recorded during late May to August. Totally 34 Coconut trees *Cocos nucifera* were observed with the Common Myna nests. They constructed their nests in the gap between the bases of leaves. The height of the nesting tree ranged between 7 and 15 m, with a mean of 10.7 ± 1.98 m. The height of the nest from the ground varied from 6 to 14 m with a mean of 9.4 ± 1.90 m. Mean DBH of the nesting tree was 34.9 ± 4.59 cm (range: 24-45 cm) (Table 1).

The Common Myna used a variety of nesting materials for nest construction, mostly roots, fine twigs, polythene papers, leaves, cloths, feathers and snake skins. The materials were arranged in the form of cup with a central depression for laying the eggs.

The eggs were glossy blue with oval in shape, hard and glossy in texture. A total of 120 eggs had a mean length of 3.34 ± 0.11 cm (range: 3 - 3.5 cm). The breadth was 2.32 ± 0.09 cm (range: 2.1 - 2.5 cm). The weight of the eggs ranged between 6 and 9 g with a mean of 7.71 ± 1.50 g. Clutch size of varied from 3 to 5 eggs with a mean of 3.2 ± 0.57 (Table 2). The incubation period varied from 14 to 17 days and both parents took prominent role in incubation.

Of the 120 eggs laid in 34 clutches, 106 eggs were hatched having success of 88.3%. A total of 89 young ones fledged during the study period working out to a fledging success of 83.9% (Table 3).

Table 2

Morphometric details of the Indian Roller, Common Myna and Black Drongo eggs in the study area.

Egg variables	Species	Range	Mean \pm SD
Length (cm)	Indian Roller (n = 14)	3.3 – 3.9	3.60 \pm 0.18
	Common Myna (n = 120)	3.0 – 3.5	3.34 \pm 0.11
	Black Drongo (n = 17)	2.4 – 2.9	2.67 \pm 0.13
Width (cm)	Indian Roller (n = 14)	2.7 – 3.1	2.97 \pm 0.14
	Common Myna (n = 120)	2.1 – 2.5	2.32 \pm 0.09
	Black Drongo (n = 17)	1.9 – 2.1	2.03 \pm 0.06
Weight (g)	Indian Roller (n = 14)	12.0 – 15.0	13.81 \pm 0.87
	Common Myna (n = 120)	6.0 – 9.0	7.71 \pm 1.50
	Black Drongo (n = 17)	4.0 – 6.0	5.00 \pm 0.86
Clutch size	Indian Roller (n = 4)	3.0 – 4.0	3.67 \pm 0.57
	Common Myna (n = 34)	3.0 – 5.0	3.20 \pm 0.57
	Black Drongo (n = 5)	3.0 – 5.0	3.40 \pm 0.54

Table 3

Hatching and fledging success of the Indian Roller, Common Myna and Black Drongo in the study area.

Species	Total No. eggs laid	No. of eggs hatched	Hatching success (%)	No. of nestling fledged	Fledging success (%)
Indian Roller	14	09	64.2	6	66.6
Common Myna	120	106	88.3	89	83.9
Black Drongo	17	14	82.3	12	85.7

3.3. Black drongo

The breeding activities were recorded from March to June in the study area. The Black Drongo mostly preferred the Rain trees *Enterolobeum saman* for nesting (n=3) and they also use the Babul tree *Acacia nilotica* (n=1) and the Neem tree *Azadirachta indica* (n=1) for nest construction. The nests were built at points closer to the peripheral extremities of branches of the tree. On an average the nest tree was 14.5 \pm 7.98 m high (range: 7 - 25 m) with a DBH of 43.5 \pm 9.93 cm (range: 30 - 75 cm). The nest was located at heights of about 6 to 13 m (8.0 \pm 4.65 m) from the ground (Table 1).

They construct a thin bottomed cup nest with small twigs, grass and fibers on the peripheral extreme branches of the tree. A completed nest weighs about 28.4 \pm 3.47 g and has a circumference of 39 \pm 4.54 cm and a cup depth of about 4.1 \pm 0.48cm.

The Black Drongo lays elliptical and white eggs with red spots. The red spots were spread all over and it was bigger at the broader end. The eggs were 2.4 to 2.9 cm long (2.6 \pm 0.13 cm), 1.9 to 2.1 cm broad (2.0 \pm 0.06 cm) and weighed 4.0 to 6.0 g (5.0 \pm 0.86g). The clutch size varied from 3 to 5 (3.4 \pm 0.54) (Table 2). The incubation period varied from 15 to 18 days and both parents incubate the eggs.

Out of 17 eggs laid, 14 hatched showing a hatching success of 82.5% and a fledging success of 85.7% (Table 3).

4. Discussion

The Indian Rollers are secondary cavity nesters, they dependent on natural tree holes/cavities or the abandoned nest of the primary cavity nesters such as Rose-ringed Parakeet *Psittacula krameri* and Golden-backed Woodpecker *Dinopium benghalense* for breeding. The Indian Roller nests were recorded *Cocos nucifera*, *Ficus benghalensis* and *Borassus flabellifer* trees. Earlier, Asokan et al. (2009a) recorded Indian Roller nests on *Cocos nucifera*, *Borassus flabellifer*, *Ficus benghalensis* and *Enterolobium saman* trees in Cauvery Delta region of Southern India.

Height of nesting tree, nest cavity location and DBH was different when compared to certain previous workers. Panicker (1978) recorded the nest holes more frequently between 3.6 and 8 m (Mean: 6.16 m). Thiyagesan (1991) reported mean height of nesting tree, DBH and nest hole location height of 11.03 m, 37.58 cm and 9.95 m respectively in Southern India. Asokan et al. (2009a) recorded that mean of 14.6 m nest tree height, 5.8 m nest hole location height and 66.7 cm tree DBH. It is felt that the level where height and 37.58cm tree DBH.

The average measurements of hole length, circumference and depth was moderately larger than average dimensions reported by Panicker (1978) and Thiyagesan (1991). No nest material was used by the Indian Roller in the tree holes. Lamba (1963) and Panicker (1978) stated that no nest material was used by Indian Roller and the eggs were laid directly on the decayed debris of wood at the bottom of the hole.

Regarding eggs and incubation, the mean clutch size as observed in the nests of Indian Roller was higher value to that reported by Panicker (1978) and was similar value to that reported by Asokan et al. (2009a). The hatching (64.2%) and fledging (66.6%) success of present study was relatively similar to work of Asokan et al. (2009a) and very higher when compared to previous work of Panicker (1978).

Sengupta (1982) and Pandey and Mohan (1992) recorded the Common Myna nests between 6 and 18 m and nest location between 4 and 10m high trees. The observation of the present study was in agreement with the above authors.

In the present study the Common Myna used various kinds of nesting materials. Sengupta (1982) stated that Common Myna used dry twigs and sticks, polythene-papers, rags, feathers of different birds, straw, leaves, dry grass and snake-sloughs for nest construction. Panicker (1978) also stated they used mostly miscellaneous mass of feathers, straw, fine twigs, leaves and paper bits as nesting materials.

Panicker (1978) reported egg dimensions of the Common Myna are 27.3 ± 2.02 mm length, 19.7 ± 2.05 mm width and 7 g weight. Sengupta (1982) recorded incubation period between 13 and 14 days. Lamba (1963) has found the incubation period between 16 and 18 days and according to Panicker (1978) it varies from 12 to 16 days. Results of the present study were similar to those of earlier works.

Hatching success of the Common Myna in this study was relatively higher when compared to that of Lamba (1963) and Sengupta (1982) who recorded that the nesting success in the Myna is 61.36% and 75.55% respectively.

The Black Drongo preferred trees such as *Enterolobeum saman*, *Acacia nilotica* and *Azadirachta indica* for nest construction. Shukkur and Joseph (1978) recorded most of the Black Drongo nests are in Jackfruit trees *Artocarpus integrifolia* at the Calicut University campus, Kerala, India. In this study the Drongo preferred 7-25 m tall trees for nest construction and nests were located at a height of 6-13 m. Shukkur and Joseph (1978) stated that Black Drongo preferred 5 to 30m tall trees for nesting and height of 2.5 to 13m for nest locations.

Mean length, width and weight of the eggs and incubation period was more or less similar to the findings of Shukkur and Joseph (1978). The rainfall and the food availability are the key proximate factors which determine both clutch size and timing of breeding for many bird species (Boag and Grant 1984; Lloyd 1999).

The fledgling success of the Black Drongo in the present study was 85.7%. Panicker (1978) stated that the breeding success depends on the parents in providing food for the young ones. Various factors like the availability of mates, suitable nesting-sites, materials for nest, temperature, moisture and rainfall could have influenced the nesting success of bird species.

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