IMPACT OF SUNLIGHT ON THE ORIENTATION OF BAYA WEAVERBIRD NESTS.

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Submission date: 25-Feb-2025 05:19PM (UTC+0700)
Submission ID: 2576796829
File name: IJAR-50399.docx (30.92K)
Word count: 1953
Character count: 9965

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Abstract: The Baya weaver (*Ploceus philippinus*), renowned for its distinctive nest, is often called "the king of nest-building birds." It's nest is easily recognizable due to its unique elongated, inverted bottle shape. Successful Reproduction for bayabirds requires them to have built 'good'nests. This paper explores the impact of light direction on the orientation of nests. The study, conducted from August 2019 to July 2020 in Shivamogga, gathered detailed nest data using the direct count method.A total of 455 nests were recorded across four zones during the breeding season: 233 complete, 167 incomplete, and 55 abnormal. The East direction averaged 15.16 ± 9.53 nests per zone, showing significant variability. The West direction averaged 2.5 ± 1.67 nests, reflecting lower nesting activity . Most nests are oriented toward the East and Northeast to capture the warmth of the sunrise, ensuring an ideal temperature for the eggs and chicks.

Key words: Baya weaverbird, Ploceus philippinus, Orientation, Shivamogga

INTRODUCTION

The Baya weaver bird (Ploceus philippinus), often referred to as "the king of nest-builders," is found across the Indian subcontinent. It is named for its unique, elongated, inverted bottle-shaped nest. The bird's breeding season runs from August to December, with nests built in colonies of anywhere from 2 to 100 individuals. During this time, the male sports vibrant golden-yellow plumage on its chest and head, while the female remains a dull light brown. Constructing a complete nest takes around 18 days. As a key species in its ecosystem, the Baya weaver is a natural marvel, showcasing incredible instincts and behaviors in both nest architecture and reproductive strategies. For birds, the choice of nesting site also influences the thermal conditions of the nest, impacting the eggs and chicks exposed to (Hartman and Oring 2003; Lloyd and Martin 2004; Mainwaring et al. 2014). This is why many bird species select a certain nest location and orientation to ensure an optimal microclimate that guarantees reproductive success (Conway and Martin 2000; Hartman and Oring 2003; Mainwaring et al. 2016).

Nest orientation influences the temporal pattern of heating and cooling within a domed nest due to the direction of the sun's path across the sky and the prevailing wind direction. During the breeding season in the northern hemisphere, the sun rises roughly in the east-northeast. Consequently, nests oriented eastward receive most of their solar input during cooler morning hours, and the domed roof provides shade during the hotter afternoon hours. Ground-nesting passerines at mid latitudes with domed entrances typically face their nests toward the east or northeast, but those breeding in warmer, low-latitude regions orient nests in a more northerly direction (Burton 2007).

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In this study, we have made the first attempt to test whether light direction influence nest orientation. A total of 455 nests were sited from four different zones during breeding season among them 233 are complete, 167 incomplete and 55 are abnormal. Orientation of these nest observed among eight direction (East, West, North, South, North East, North West, South East, and South West) the studies revealed that East region has the highest nesting activity, with a total of 182 nests, dominated by complete nests. This region shows a high variability in nest counts across zones, as indicated by a relatively high Standard deviation (9.53).West and North regions report the lowest nesting activity, with total counts of 30 and 14 nests, respectively. The West region, in particular, shows very few nests across all types. The average ± SD values suggest that most regions have moderate variability in the number of nests, with the East and NE regions showing the highest variability. The presence of incomplete and abnormal nests is generally low across all regions, suggesting that most nests are complete nests.

Study Area

Shivamogga City Corporation, located in the heart of Karnataka, spans roughly 50 km^2 (19.31 square miles). This city lies within the Malnad region, characterized by its hilly terrain. With a tropical wet and dry climate, Shimoga experiences a monsoon season from June to October, bringing heavy rainfall. The average annual temperature remains around 26°C, with rainfall primarily influenced by the South-West monsoon winds, which bring moisture from the Arabian Sea.

Methodology

The study was conducted from August 2019 to July 2020, concentrating on 455 nests of *Ploceus philippinus* located in and around cultivated fields. Potential nesting sites were systematically monitored through direct observation techniques to identify Baya weaver nests and gather data on the birds and their nests (Naik, 2006). Nesting locations were determined by following the birds' calls and songs, with occasional assistance from local farmers and residents. Nests were visually censused when within close range, while distant observations were carried out using 10x50 DPSI binoculars, ensuring minimal disturbance to the birds and their nests. The precise locations of nest-supporting plants and power lines were recorded using a standard GPS. Photographs and videos of the colonies were taken with a Canon EOS 700D and Nikon Coolpix L810 cameras.

RESULTS

A total of 455 nests were sited from four different zones during breeding season among them 233 are complete, 167 incomplete and 55 are abnormal. This study presents a detailed examination of the distribution of three types of nests—Complete Nests, Incomplete Nests, and Abnormal Nests—across eight direction (East, West, North, South, North East, North West, South East, and South West). The data is recorded across four zones. Additionally, the average and Standard deviation (SD) of nest counts for eight direction East, West, North, South, North

East, North West, South East, and South West was 15.16 ± 9.53, 2.5 ± 1.67, 1.16 ± 1.74, 3.16 ± 3.21, 7.25 ± 6.53, 1.25 ± 1.6, 5.75 ± 4.28 and 5.75 ± 4.28 respectively (Table 1 and Fig 1).

The East region exhibits the highest nest counts across all categories, with the complete nests being the most numerous. Zone-3 has the highest count of complete nests (34), while Zone-1 has a significant number of complete nests as well (21). There are also notable numbers of incomplete and abnormal nests, particularly in Zone-2 (14 incomplete nests and 6 abnormal nests). The average number of nests per zone for the East region is 15.16 ± 9.53. The relatively high Standard deviation suggests considerable variability in nest counts across zones.

The West region records the fewest nests across all regions, with complete nests being the most prevalent type. However, the numbers remain low, with only 7 complete nests in Zone-3. The counts for incomplete and abnormal nests are also low. For example, Zone-1 has just 1 incomplete nest and 1 abnormal nest. The average number of nests in the West region is 2.5 ± 1.67, which reflects the overall lower nesting activity in this region, as well as some variability across zones.

The NE region has 87 nests in total, with complete nests being the dominant type. Zone-3 stands out with 17 complete nests. The region also exhibits notable counts of incomplete nests (particularly Zone-3 with 13 incomplete nests) and abnormal nests (with Zone-1 having 3 abnormal nests). The average for the NE region is 7.25 ± 6.53, indicating moderate nest counts with higher variation compared to other regions. The SE region reports 69 nests, with complete nests being the most prevalent type. There is a moderate presence of incomplete nests in Zone-1 (3 incomplete nests) and Zone-3 (13 incomplete nests). The average number of nests in the SE region is 5.75 ± 4.28, indicating moderate nest formation with some variability across zones.

Table 1: Orientation of various types of nests according to different directions. (CN-Complete nest , ICN-Incomplete nest and AN-Abnormal nest)

ZONES	**ZONE-1**			**ZONE-2**			**ZONE-3**			**ZONE-4**			AVERAGE ± SD
TYPES OF NESTS	CN	ICN	AN	CN	ICN	AN	CN	ICN	AN	CN	ICN	AN	
EAST	21	5	3	20	14	6	34	18	12	23	22	4	15.16 ± 9.53
WEST	3	1	1	3	3	2	7	3	2	3	1	1	2.5 ± 1.67
NORTH	2	0	0	1	2	0	6	0	0	2	1	0	1.16 ± 1.74

SOUTH	7	0	0	5	2	3	9	0	1	4	7	0	3.16 ± 3.21
NE	9	1	3	3	10	1	17	13	4	5	20	1	7.25 ± 6.53
NW	5	3	1	0	0	0	1	3	1	1	0	0	1.25 ± 1.6
SE	10	3	2	8	8	0	13	10	6	2	7	0	5.75 ± 4.28
SW	5	2	0	0	2	0	3	6	1	1	0	0	5.75 ± 4.28

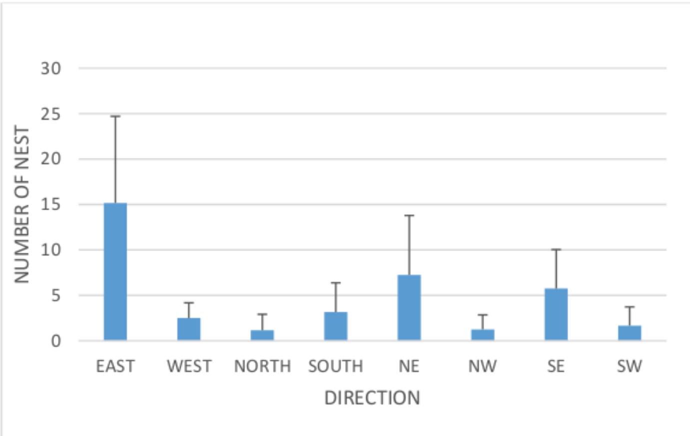

Fig 1: Number of different nests orientation in different zones according to different directions.

CONCLUTION

The analysis reveals that the East is the region with the highest nesting activity, particularly in terms of complete nests, while other regions, such as the West and North, show significantly lower nest counts. The data also highlights moderate variability in nest numbers, with some regions like the Northeast (NE) and South showing higher variation across zones. The East region has the highest nesting activity, with a total of 182 nests, the majority of which are complete. The presence of incomplete and abnormal nests is generally low across all regions, suggesting that most nests are complete. This could be because they are oriented toward the East to provide the necessary temperature for incubation and to keep the nestlings warmer. In the early morning, temperatures are often very low, so most nests are oriented toward the East and Northeast to capture the warmth of the sunrise, helping to maintain an ideal temperature for the eggs and chicks.

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