



TEMPERATURE EFFECT ON BREEDING BIOLOGY AND ABNORMAL NEST BEHAVIOUR OF BAYA WEAVER (PLOCEOUS PHILIPPINUS) IN SEMI-ARID AREA OF SHEKHAWATI REGION IN RAJASTHAN

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ABSTRACT

*Indian Baya Weaver (*Ploceous philippinus*) is a popular bird in Shekhawati region, this region include Sikar, Jhunjhunu and some part of Churu districts. This bird is famous for its beautiful, retort and charming nest. Baya weaver have love and hate relationship with local people. Nest are make by male birds and selects by females, after selection of nest male and female copulate in nest and female lays 2 to 3 eggs. Developments of these eggs and chicks are directly depend and affects by environmental factors the one of major's factors are temperature and rainfall. For this purpose we select 21 nests and some colony of nest. Growth and development of chicks are influence by its surrounding temperature, we take temperature measurements inside nests in a colony and its surround environment by Laser thermometers and observe chick development and abnormal nest prepared by bird interpreted these data in reference of growth pattern of chick and nest structure and its morphology. Key words: - Temperature, Baya weaver, Nest, Growth pattern, Abnormal nest*

INTRODUCTION

NEST IMPORTANCE FOR BIRDS

Birds build several of kinds of nests for protecting themselves from rain, high or low temperature from predators and enemies and to rest during day or night time. Nest is a safe place for egg laying and protected place for developing nestlings is another important aim behind nest building in birds, whereas several species of birds use naturally available shelters as trees, cavities in tree trunks and branches, parts of buildings. There is great variation in nest building material being used by bird species was first found (Sharma, 1987) Leaves, twigs, wet or dry branches of trees, thread parts of grass leaf blade of Bajara are used by birds to build the nest in Shekhawati region (in our study area).

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Only one kind of material or mixed types of materials was also found being used by bird species (Sharma, 1987) in various parts of world as per season, environmental conditions, migration patterns and breeding cycles of bird species the nest are built by this bird. Normally bird built nest average size nest in length and diameter but in some adverse climatic condition like heavy rainfall, irregularity of rainfall and temperature intensity bird built some abnormal nest.

RELATIONSHIP BETWEEN NEST AND ENVIRONMENT TEMPERATURE

Various species of bird and distributions and climate change species distributions are determined by a range of different factors, climate is one of the most important ones (Von Humboldt 1808). There is little doubt that climatic conditions influence the survival and reproduction of individuals and in turn the distributions of species, even though some controversy remains about the relative importance of climate as determinant of species distributions (Currie 1991). It is numerously observed that species have shifted their ranges in response to the climatic fluctuations (Davis T.A 1971b) Baya weaver has recently observed in some desert area of Rajasthan like Jodber area of Bikaner district, it is a good example of environmental factor. During the last century, global average temperature has risen by approximately 0.7 °C, due to anthropogenic greenhouse gas emissions (IPCC 2007). Contemporary climate change has been shown to cause range shifts of species (Parmesan *et al.* 1999) as well as changes in body structure, physiology or morphology of bird (Parmesan 2006). Global warming is projected to continue and increase during the next decades. Depending on the climate change models and emission scenarios used, global average temperatures are projected to rise by 1.8 to 4.0 °C until 2100 (IPCC 2007). Based on these climate change scenarios, dramatic consequences are anticipated for biodiversity Interactions between climate change and other threats, such as habitat destruction and the spread for biodiversity.

INDIAN WEAVER BIRD (*Ploceous philippinus*)

Indian Baya Weaver (*Ploceous philippinus*) is a popular bird in various regions in India and found in several countries and also found in Shekhawati region this bird famous for its beautiful, retort and charming nest. This bird has love-hate relationship with local people. Nest are made by male birds and finally selects by females birds if it is okay male and female copulate in nest and female lay eggs (Ali 1931). Developments of eggs directly affects by environmental factors, one of majors factor are temperature. For this purpose such study we select some nests in a colony. Growth of chicks are influence by temperature, we take temperature measurements in nests in a colony and surround environment by Laser thermometers and interpreted these data in reference of growth pattern.



Plate-1 Male bird preparing Nest



Plate.-2 Female bird inspect nest



Eggs of Baya weaver



Plate-3 Male bird

Plate- 3



Plate-4 Developed chick

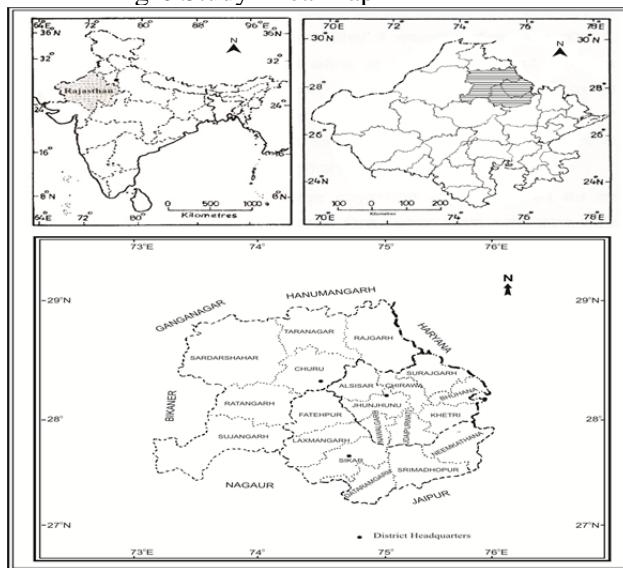


Plate-5 Nest colony of Baya weaver

STUDY AREA: -

For the observation of nesting sites and abnormal nest of Baya weaver (*Ploceus philippinus*) our survey was conducted during July 2016 to October 2016 in three districts of Rajasthan Sikar Churu and Jhunjhunu these district include **Shekhawati region**. The study area for present investigation is located in north-western Rajasthan. The region has a vast and wide variety of flora and fauna. North-western part of Rajasthan represents the arid region among ten bio-geographic regions of India. The state of Rajasthan lies between 23°30' and 30°11' North latitude and 69°29' and 78° 17' East longitude (fig.-6) The study area of covers **Jhunjhunu, Sikar, Churu, and it is roughly 500sqkm area**. Our observations have been taken from these areas.

Fig-6 Study Area Map



MATERIALS AND METHODS:-

Our study is focused on Baya weaver breeding biology and its nest type regarding temperature as we know bird nest are famous for attractive, charming and decorative type and these nests are mostly made by this bird in croplands areas in study area of **Shekhawati region specially Jhunjhunu, Sikar and Churu districts**. We have taken data from these three districts in Month July to October year 2016. The Shekhawati region has a sub-tropical climate, which is exceptionally seasonal with a cold winter (November- February) hot summer (April-June) and warm rainy season (July-September). The scarcity of water and food, intense radiation, dry winds, strong sandy storms, wide diurnal and seasonal variation in the temperature and low humidity are the common characteristic features of the area. Regular field trips were made throughout the period. I observed the Baya weaver during the breeding season (July- October) using a photographic camera (Nikon) and a 10 x 50 binocular (Nikon). About 12 hours were spend time to time in the study field and observed nests type, temperature and breeding pairs were recorded in breeding season 2016. During the observation the nests activities like nest temperature, environment temperature taken by **Laser Thermometer** no of eggs laying by bird, no of eggs, incubation period and development process of chick, abnormal type nest if were counted.



Plate.-7 Abnormal doubles
Brood chambers



Plate.-8 Abnormal two joint Nest



Plate-9 Two nest attached with a stalk



Plate-10 Three opening nest

Table 1 Comparisons of Temperature of Different Nest in different time periods

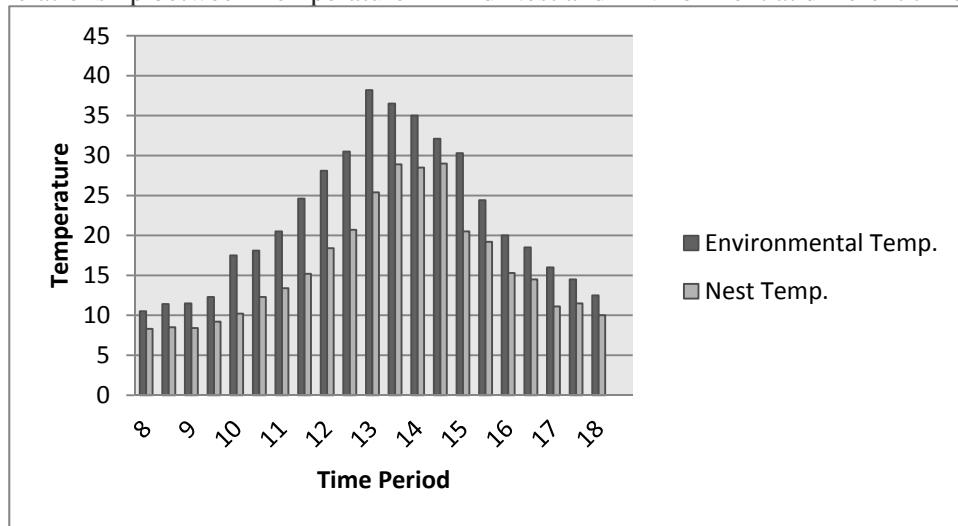
S.N	Times (in hrs.)	Environmental Temperature (in °C)	Nest Temperature (in °C)
1	8.00	10.5	8.3
2	8.30	11.4	8.5
3	9.00	11.5	8.4
4	9.30	12.3	9.2
5	10.00	17.5	10.2
6	10.30	18.1	12.3
7	11.00	20.5	13.4
8	11.30	24.6	15.2
9	12.00	28.1	18.4
10	12.30	30.5	20.7
11	13.00	38.2	25.4
12	13.30	36.5	28.9
13	14.00	35.0	28.5
14	14.30	32.1	29.0
15	15.00	30.3	20.5
16	15.30	28.4	19.2
17	16.00	20.0	15.3
18	16.30	18.5	14.5
19	17.00	16.0	11.1
20	17.30	14.50	11.5
21	18.00	12.50	10.3

COPMARISION OF TEMPERATURE IN NEST AND ENVIRONMENT

Baya weavers (*Ploceus philippinus*) have a great relationship with surrounding environment and climatic factors, these factors effect directly or indirectly distribution of bird, ecology of bird, nesting behaviour, feeding behaviour, breeding and development and growth pattern of any bird. We recorded the temperature of environment and inside nest temperature just to observe if there is any variation in it (Table-1, Fig-11). The data indicate that there is significant difference in temperatures this difference is generate by wet thin pliable threads choose by birds during nest constriction these materials make coolant in the comparison its surrounding climate such difference provide the micro-climate of chicks comfortable and enhance their chances of survival(Plate-3,4). We found some nest and surrounding environment activity of bird and chick inside nest. The given table shows that the minimum temperature observed in the nest was during early morning 8.00 AM (10.5°C, 8.3°C) and maximum temperature was around 13.00 PM (38.2°C, 25.5°C). We recorded the difference in temperature in the nest and outside as follows: The outside and the nest temperature around 13.30 PM were 36.5°C and 28.9°C respectively, and at 14.30 PM they were 32.1°C and 29°C and at 18.00 PM temperature of environment and nest were 12.5°C and 10.3°C. This difference in the temperature indicates that internal temperature of bird's nest is comparatively low such difference provides support for maintaining vital activity like development in the egg which enhances the survival rate of young and delicate chicks in the harsh climate of desert region (Table 1, Fig-11). Table 1 indicate both temperature has difference, this difference make easy to survive chicks but past four years climate condition and temperature increase due to global warming so the breeding rates decrease and unusual

and irregular rainfall may arise so abnormal nest are prepared by this bird these birds are observed in the months of October and November (Plate-7, 8 and 10).

Fig.11 Relationship between Temperature in Bird Nest and Environment at different time period



We find some important information from given Fig.-8 that minimum temperature observed at early morning 8.00 AM (10.5°C , 8.3°C) and maximum temperature at 13.00 PM (38.2°C , 25.4°C) same time we find temperature difference in nest 13.30 PM (36.5°C , 28.9°C) and 14 PM (35°C , 28.5°C) and at evening 18.00 PM temperature of environment and nest are (12.50°C , 10.3°C) this difference tells us that internal temperature of bird nest is comparatively low so animal and their egg can easily survive their biological activity like fertilization, cleavage, feeding and development goes properly (Fig.-11,).

ABNORMAL NEST:-

Abnormal nests of Baya Weaver have been observed in various places of India (Ambedkar 1980, Davis 1985, Sharma 1985, 1988, 1995), nearly 15 types of abnormalities had been recorded in baya nests, and these nests are different in structural complexity. (Ambedkar 1980 and Davis 1985) recorded structural modification and complexity types of bi-storied nests. Abnormal nest have some qualitative aspects. Nest of *Ploceus philippinus* besides typical nests, are otherwise called abnormal nests. It is not only the young male adults which build various types of abnormal nests but sexually mature old male birds also do so during breeding season. Many variations can be seen in nests of Baya which make a nest abnormal. Variations may be of the following kinds fused, stomach shape, fused, blind, multi-stalked, Bell jar shaped, Bi-storied, Multistoried, Chain nest. In our study area we observed only stomach shape, Fused, double brood chamber and three opening type nest of this bird. We have observed various abnormal nest in our study area these are jointed, three opening and two brood chamber nests (Plate- 7, 8, 9 and 10). It is the opinion that abnormal nests have some survival value. As the length of the nest increases, the snakes find it more and more difficult to approach the contents of the lower nests of a multi -storied nests (Ambedkar 1980).

CONCLUSION:-

Baya weaver has a close relationship with environment and climatic factors, these factors effect directly or indirectly bird distribution, ecology, nesting, pattern due to delay in rainfall high and low temperature bird make **abnormal nest in various shape, size and structure**, feeding, breeding and growth pattern. This species invented in western Rajasthan due to change of climate and vegetation

and observed recently in some western part of Rajasthan like Bikaner and some irrigation system of IGNP (Indira Gandhi Nahar Pariyogna) in Ganga Nagar and Hanumangarh district.

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