

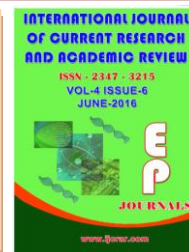


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### Nesting of Baya Weaver (*Ploceus philippinus*) in S. R. T. M. University, Nanded and Fields along Asana River at Nanded, Maharashtra, India

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#### KEYWORDS

Baya weaver (*P. philippinus*), nest, SRTM University, Nanded.

#### A B S T R A C T

Baya weaver (*Ploceus philippinus*) is one of the common weaver bird from South-Central states of India. Male construct and display the nests, weave the nest by using locally available grass (*Palm Fronds*) leaf blade threads of 1.5-2.0 ft. 435 nests/10 km<sup>2</sup> were found on 09 plant species of 06 families on total 82 number of host trees. *Acacia nilotica*, *A. karroo* trees were mostly used for the nest construction. 90 % was nesting success observed. Nest characters were recorded for the complete and incomplete nests. 90 % was success rate of breeding indicating female population was 392/10 km<sup>2</sup>, whereas the male population was data deficient. Average number of nests were 5.30/ trees. 100 % nests were left abandoned after completion of breeding. Weavers of all age group found to migrate locally to nearby agriculture fields specially Jowar (*Sorghum vulgare*) acting as pest. Female was found finisher of nest after pair selection.

### Introduction

Birds build variety 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. Assured and 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, crevices in hills and mountains etc. and they do not built the nest.

There is great variation in nest building material being used by bird species was found (Sharma, 1987; Shivaji et. al., 2016). Leaves, twigs, wet or dry branches of trees; thread parts of grass leaf blade or whole grass, small stones and pebbles and gravels, mud pellets, plastic and polythene pieces, color glass pieces; parts of shrubs etc. are used by birds to built the nest. 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.

Since ancient time the nest building by weaver bird species Baya weaver (*Ploceus philippinus*) has amazed the human being due to beautiful shape, texture and engineering of nest building. It is weaving of the nest bag hanging safely to the terminals of tree branches is not a handicraft but it is beak-craft. It is one of the beautiful craft piece built by such a small bird simply by using its beak and partially by two legs. The efforts and time spent by weaver bird to develop the beautiful hanging nest are amazing, male construct the nest and invite female for nest selection. In the present investigation despite of major known facts about nest building in weaver bird (Asokan *et al.*, 2006) some new inputs are being added to strengthen the available data on nest building by this bird species which is not reported earlier. The weaver bird though found as pest for the grain crop (Jowar, Wheat, Rice etc.) but its role as natural biological control on agriculture insect pest cannot be ignored. To provide to the developing chicks it hunts several hundreds of insects like Grasshoppers from crop fields (Sharma and Vyas, 2005).

The role of this bird species in natural grassland ecosystem and agriculture system is not yet understood fully. It is well known that, the knowledge of human being about ecosystems in its surround is only 1-2 %. Chavan *et al.*, (2015) recently reported the existence of 168 species of birds from Nanded area with detailed account on checklist and the photo-plates. There is little known data on about the nests and nesting of weaver birds from Nanded region of Maharashtra hence to investigate some new details on nest building and population of this weaver bird species in and around

Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra State, India the present investigation was planned.

## **Materials and Methods**

### **Study area**

For the observation of nesting sites of Baya weaver (*Ploceus philippinus*), survey was conducted during July 2015 to January 2016 in 10 km<sup>2</sup> around S. R. T. M. University, Nanded. To every direction from the University each tree as possible site of nest building was observed carefully for the existence of Baya weaver nest by point count and encounter methods to collect the data about the nesting site and nests. The details on ecological conditions around the nesting site were also recorded. Ten different sites for the observation were selected in 10 km<sup>2</sup> area. 7x15 inch field binocular was used from artificial created and available hideouts for the observations. Nikon Cool-pix 510 camera (with auto-fixed zoom 16 pixl, 43 zoom) was used for the photo and video of nest construction process and weaver bird activities. Camera was operated using BENRO made tripod stand to avoid the shaking effect.

## **Results and Discussion**

### **The Tree Species selected by Weaver Bird for the nesting**

It was observed that, the weaver bird has division of labor in nest building. Male of this species has typical yellowish plumage on its back and strong built up with little larger body size as compared to small size and ashy gray colored female. When the monsoon starts during month of July, August each year in this part of the world, the grasslands flourish and grow well till end of August to September. In the monsoon season early months July to August the

male of this Baya weaver species select the nesting site (Davis, 1974) and a particular tree species (Table 1). In this study area *Acacia nilotica*, *Prosopis juliflora*, *Azadirachta indica*, *Ziziphus mauritiana*, *Acacia karroo*, *Magifera indica*, *Dalbergia sisooroxh*, *Cocos nucifera*, *Ficus religiosa* these 09 tree species belongs to 06 families were found selected by this bird for nest building. Total number of trees used/10 km<sup>2</sup> were 82 and total number of nest built were 435. Details of tree specific number of nests are enlisted in the Table 1 and characteristics of host tree species used for nesting are in Table 2.

### About the Nest of Baya weaver (*Ploceus philippinus*)

Typical kidney shaped nest with suspension, brood chamber, threshold and entrance tube was found constructed mainly by male of *Ploceus philippinus* (Fig. 2). Only one kind of nesting material was used to construct the nest proper that was 1-2 ft. long thin threads of locally available grass (*Palm fronds*) (Fig.1) leaf blades. Maximum 286 nests were built on *Acacia nilotica* whereas only one nest was built on *Mangifera indica* (Mango tree).

Maximum average number of nest built were 17 / tree on *Ficus religiosa* (Peepal) and minimum one / tree on Mango tree. On nine *Ziziphus mauritiana* (Ber) trees the total number of nests were 41, average 4.5 nests /tree. On seven trees of *Prosopis Juliflora* (S. Babool) there were 14 nests in total with average 2 nests/tree. On five trees of each Neem (*Azadirachta indica*) and Dev babool (*Acacia karroo*) there were 18 nests (3.6 / tree) and 39 nests (7.8 / tree) respectively. On one Shisam tree (*Dalbergia sisooroxh*) there were 13 nests and 13 / tree. On one Coconut tree (*Cocos nucifera*) were exists six nests (6 nests/tree). There were 179 complete nests on *Acacia nilotica*

followed by 37 on *Ziziphus mauritiana* (Ber). 21 nests on *Acacia karroo*, 15 nests were on *Ficus religiosa*, 13 on *Azadirachta indica*, 09 complete nests on *Dalbergia sisooroxh* 05 nests on *Prosopis juliflora*, and 01 complete nests on Mango tree. Similarly 104 nests were found in incomplete stage on *Acacia nilotica*, 18 incomplete nests on *Acacia karroo*, 09 on *Prosopis juliflora* and least number i. e. 01 incomplete. 27 nests were one chambered, two chambered 06 and three chamber nests were 01 out of total 435 nests were found in the study area. Maximum one chamber nests were 177 on *Acacia nilotica*, minimum 01 chamber nests were 02 on *Acacia karroo*. Two chamber nests were 02 each on *Acacia nilotica* and *Fecus religiosa* (Fig. 4), minimum 02 chamber nests were 01 each on *Ziziphus* and *Dalbargia species*. A complete nest with three chambers was found only 01 on *Acacia nilotica* (Fig. 1) at site near Asana river near Nanded city Table 3. All reported nests on all trees were built at East direction of host tree so as to avoid the impact of sun radiation and wind from west and south-west side.

The nests of Baya weaver at 10 different nesting sites were collected by random sampling one nest from each site for their morphological measurements. Length of tree branch after point of nest fixing, length of nest suspension, length of nest, length of brood chamber, nest depth, length of threshold ,length of entrance tube were selected parameters. All measurements are in cm. and figures in parenthesis are average values (AV). The nests without threshold and entrance tube are called as incomplete nest. The length of branch was 6.1 to 8.0 (AV. 7.09), length of suspension was 2.00 to 20.0 (AV. 9.32), the nest length was 6.00 to 8.4 (AV 7.42), the length of brood chamber was 3.0 to 4.3 (AV. 3.65), the nest depth was 5.0 to 6.2 (AV. 5.94), the length of threshold was 2.0 to 4.2 (AV. 3.1), and

lastly the length of entrance tube was 4.2 to 9.5 (AV. 6.27). The length of branch was 6.2 to 7.5 (AV. 7.04), the length of suspension was 2.0 to 8.00 (AV. 5.0), the nest length was 6.2 to 8.5 (AV. 7.25), the length of brood chamber was 3.00 to 4.00 (AV. 3.31), The nest depth was 4.5 to 5.5 (AV. 5.14).

### **Characteristics of Host Tree**

Baya weaver has selected average height of tree 14.78 ft. Total 371 nests were located terminal in position and 64 at sub terminal position on the selected trees. Average distance of nests from tree top was 4.0 ft. and it was 12.98 ft. from the ground (Table 2.). All the nests were in peripheral marginal parts of the selected tree. This indicates the care taken by Baya weaver on the safety of nests from predators attacking from the trees and from the ground.

### **Geographical Condition around the Nests**

To correlate the geographical conditions around the nest site the parameter selected were – Availability of nesting material, type of nesting material and characteristics, location of host tree with nest, cultivation / agriculture land, availability of water and type of predatory fauna in the regions as enemies. Availability of nesting material nearby the nesting site was measured in ft. It was observed that 10 different nesting sites selected for this study. There was grass of species *Palm fronds* at all sites at random distance from 1-15 meters and above. The maximum height of grass was 2-3 ft. The leaf blade of the grass was of length 1-1.5 ft. was used to remove a thread from it in fresh green stage of grass. It was also found that this bird species prepare nests maximum in the fields followed by selection near the human habitat; but it has not selected the place like garden, hostel, residential quarters as places for the nest building. Also it has

not selected the places like electric wires, phone lines, telephone towers for nest building (Venkataramani, 1981). Only trees were used for nest building. The location of nest building sites i.e. trees selected for nesting were near the office, building at maximum 04 places whereas few nests were near the dug-well as hanging nests on the well water. Majority of nesting sites were away from the availability of water i.e. sources of water for drinking hence it do not show any correlation with this factor. When the predators and anthropogenic impacts for nest damage (Sharma, 1997) and destruction was found, then it was observed that, human factor was most common disturbing for the nest damage at nearby all nesting sites for this bird.

After completion of brood chamber the male display its nest by calling the females, the selected nests by female were found completed by weaving the entrance tube. It is a sequential process (Quader, 2006). Females found to select the nests with green color (Fig. 3), firm weaving of nest threads as a selection criteria (Lehtonen and Wong, 2009). Nest selection rate by females was 90 % i.e. 90 ( $\pm$  5) % is the success rate of breeding in the study area. Rarely one but mostly the nests was constructed to a colony ranging from 2-30 nests/colony. No any abnormal type of nest except two and three chambered nest was found (Sharma, 1995). The orientation of nest is an important aspect in the security of laid eggs in the brood chamber of nests due to impact of wind, the laid eggs may fall down (Fecemire et. al., 1990). In the present study at sample site 2 (Table 3) we found three eggs of Baya weaver were felled on the ground due to impact of wind flow on the complete nests. The brood chamber in the nest was orientated towards the west direction to prevent the possible dropping of laid eggs on the ground from brood chamber due to impact of wind blow from west direction.

Weavers generally have separate areas for breeding and roosting. Echeverry (2014) studied the placement of nest on a 16 tree and he also studied the factor affecting on nest placement in three Kenyan Weaver bird species in Kenya, Africa and found that tree architecture, number of nests per tree and nest specific characteristics were the main variables for placement of nests on the trees. Machine learning techniques were used to investigate the hypothesis or question. In the present study it was found that the thorny trees with comparatively more height have large number of nests as compare to non-thorny and short trees. Significant difference in bottom thickness between deserted and incubated nests was observed. The female after nest selection assist in constructing thicker bottom layer of incubation chamber so as to assure the increase in brood chamber temperature whenever there is cold air outside and to keep the required incubation temperature when there is hot air outside. The African weaver bird (*Ploceus cucullatus*) shows polygynus mode of breeding (Khaleida and Lahti, 2012). It has been found that Random forest (RF) evaluation is the best traditional method as an analytical tool to explain the complex relationship between ecological and physical interactions for the studies on weaver bird nesting pattern and tree selection for nesting (Echeverry, 2014). Eagles, Hawks and some snake species were identified as predators for weaver bird species in Africa, Kenya and other parts of the world. The position of nest on a tree i.e. distance between nest and main trunk of tree or branching number of a tree. Usually weavers built the nests on most thinner branches at the terminal parts (Ali AMS, 2009; Echeverry, 2014) but we observed a random correlation between distance of nests from main trunk. Nicholas Colli as (1962) investigated in detail the nesting process in weaver birds and probably this is the unique and one of the

detail record of nest and nesting in weaver birds in the World. An experimental study of mechanisms of nest building, Brighm (2009) Studied the nest location and nesting in three weaver birds in Kenya, Africa. The study was conducted for 516 nests on 16 trees whereas in the present study we investigated 435 nests of Baya weaver at ten different localities on 82 trees belong to 09 species and 06 families. Ali (2009) studied nest site selection and prey delivery patterns to nestlings by Baya weaver (*P. philippinus*) in Nagapattam and Tiruvarur, India. In case of 29 nesting and 29 non-nesting trees were observed by Ali (2009) and found the electric wires and telephone line were present close to the nesting trees, whereas in the present study 80 trees were observed as nesting trees belongs to 09 tree species. Similarly at the nesting sites the telephone line and electric wires were not found, instead the nests were located five to ten ft. distance from the office buildings. The Baya weaver *P. philippinus* utilizes the well developed leaves of *cycas sphaerica* for nest construction and protection of nestlings was also observed, it construct nest on the leaf tip of this plant, where as in the present study the Baya weaver used leaf blades of *Palm fronds* grass to construct a nest and protection of nestlings.

Asokan *et al.*, (2003) studies on nest construction and nest microclimate of the Baya weaver. The nest construction pattern at different stages of nest and variation in the nest microclimate i.e. light, temperature and light intensity were assessed in different nests of Baya weaver (*P. philippinus*) between November 2002 and March 2003 in Nagapatham and Tiruvarur of Tamil Nadu, India. In the present study we tried to correlate various ecological factors and habitat conditions on the number of nests and types of trees used in nest construction.

One complete nest was prepared within 18 days; similarly as in the present study also the Baya weaver male birds construct a complete nest. Khan and Lahti (2008) concluded that the mate attraction dominates the behavior of colonially breeding birds. The African village Weaver (*Ploceus cucullatus*) is a polygynous bird that nests in often large colonies. Male Weavers spent most of its time for the behavior related to reproduction; greater time required for the behavior to attract the female to choice the nests Vs male-male competitions. Males performed their mating displays in synchrony and polygyny, where as in the present study is also found polygynous condition was found. Male of this weaver species constructed different nests in the same or different colony. The male *P. philippinus* spend most of the time for the behavior and activities for nest construction and reproduction. The female Weaver selected the nest. The male Weaver prepares a typical sound along with its flying display by hanging inverted to the nest to attract the female weavers. The male–male competition was found to attract the female weaver and same behavior of male was found in the

present study and another observation in this study was the rivalry was between two males to deprive each other from display of nest and colorful plumage of its body. Quader (2006) investigated that what makes a good nest? and benefits of nest choice to female Baya weaver (*P. philippinus*).

The nests of some birds are constructed exclusively by male and then displayed for females. The nests are built on the thorny trees and woven with fine fiber have high success rate of nests. Nesting success also increases with nest height and with thickness of the supporting branch, where as in the present study the male Baya weaver birds construct a nest and female selected the nest. The success of complete nest is depends on the female choice of nest and other reason of successful nesting is the male weaver birds nest constructed on the thorny trees like *Acacia nilotica* (5.5 /tree), *Ziziphus mauritiana* (4.5/tree) and *Acacia karroo* (7.8/tree) etc. These are the factors mostly observed in the present study. Selection of nesting site was also important for the nesting success.

**Table.1** Characteristics of host trees selected for nesting by Baya weaver

Sr. No.	Name of Species	Average Height in ft. (N=82)	Location of total nest		Av. dist. of nest from tree top in fit	Av. dist. from ground In fit
			Terminal	Sub-terminal		
1	<i>Acacia Nilotica</i>	16.27	249	37	3.7	13.49
2	<i>Prosopis Juliflora</i>	9.5	14	–	2.5	7
3	<i>Azadirachta Indica</i>	16.84	12	6	4.66	12.18
4	<i>Ziziphus mauritiana</i>	16.18	36	5	3.77	12.61
5	<i>Acacia Karroo</i>	22.6	29	10	5.4	17.56
6	<i>Mgifera Indica</i>	16.1	1	–	3.5	12.6
7	<i>Dalbergia Sisooroxh</i>	17.6	10	3	6	13.1
8	<i>Cocos Nucifera</i>	29.1	5	1	4.6	24.5
9	<i>Ficus Religiosa</i>	5	15	2	1.9	3.1
	Total	Av. =14.78	Total =371	Total = 64	Av. = 4.0	Av. = 12.9

**Table.2** Types of tree and number of nests of Baya Weaver in the study area

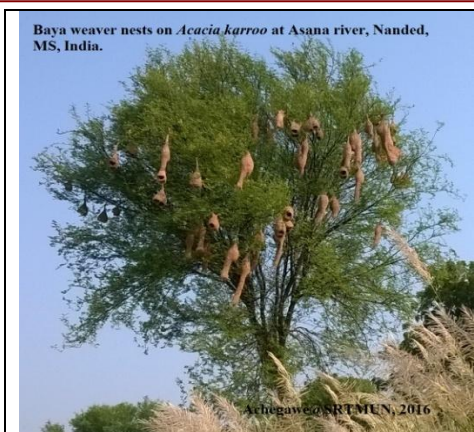
Sr. No.	Scientific name	Family	Comman name	Total number of trees	Total number of nests	Average No. of nests per trees
1	<i>Acacia Nilotica</i>	Fabaceae	Babool	52	286	5.5 / tree
2	<i>Prosopis Juliflora</i>	Fabaceae	Sarcari Babool	07	14	2 / tree
3	<i>Azadirachta Indica</i>	Meliaceae	Neem	05	18	3.6 / tree
4	<i>Ziziphus Mauritiana</i>	Rhamnaceae	Ber	09	41	4.5 / tree
5	<i>Acacia Karroo</i>	Fabaceae	Devbabool	05	39	7.8 / tree
6	<i>Magifera Indica</i>	Anacardiaceae	Mango	01	01	01 / tree
7	<i>Dalbergia Sisooroxh</i>	Fabaceae	Shisam	01	13	13 / tree
8	<i>Cocos Nucifer</i>	Areaceae	Coconut	01	06	06 / tree
9	<i>Ficus _Religiosa</i>	Moraceae	Peepal	01	17	17 / tree
Total	09	06	09	82	435	5.30 / tree

**Table.3** Average measurement of complete nests of Baya weaver (Scale in cm.)

Nesting sites	Branch	Suspe nsion	Nest length	Brood chamber	Nest depth	Thresh -old	Entrance tube
(N = 10)	7.09 cm	9.32 cm	7.42 cm	3.65 cm	5.94 cm	3.1 cm	6.27 cm

**Table.4** Measurement of incomplete nests of Baya Weaver (Number of nesting sites = 09, No. of selected trees = 82, Number of nests = 42)

Nesting sites (N= 10)	Branch	Suspension	Nest length	Brood chamber	Nest depth
Average	7.04 cm.	5.0 cm	7.25 cm.	3.31 cm.	5.14 cm.



**Fig. 1.** 1, 2, 3 chamber nests of Baya weaver on *Acacia karroo*.



**Fig. 2.** Male of Baya weaver with complete successful nest.



**Fig. 3.** Female of Baya weaver with complete nest.



**Fig. 4.** Male of Baya weaver busy in construction of entrance tube of two chamber nest.

According to Kielgast and Lotters (2009) the weaver nests are used by anuran *chiomantis species* for the protection after breeding season or depart nesting. To the best of the observation this is the first ever report of utilization of bird nests by amphibians, where as in the present study in the Nanded, Maharashtra, India the nests remain survive and left unused after breeding were not used by other creatures. The observation in the present study area indicates that, the male of this weaver do not destruct their own nests. No further use of the weaver nest except piece of ornament in the home used by some people. It was also found that due to wind waves and impact of high temperature of summer there was formation of a hole (3-8

cm) in the nest wall above the brood chamber almost in all nests, entrance tube and threshold part. We tried to observe the activities of male and female Baya weaver but neither male nor the female return to the nest once they left the nests after completion of incubation and fledging of young ones hence the observation by Collias (1964) that the nests after breeding and fledging are destructed by male was not found in this study.

In the month of January-February adults and young ones of all age group were observed feeding on the Jowar crop located at 1-10 km distance from the nesting site. In another investigation on Baya weaver by Lehtonen



and Wong (2009) who tried to investigate that, should females prefer males with elaborate nests? It is widely assumed that when males alone are responsible for nest building, nest characteristics should reflect the quality of its owner and that the nest itself should be an important cue in female choice. When it was experimentally suggested that the nest quality from other male traits, it was found that female did not prefer to spawn with male that had the most elaborate nests, where as in the present study area the male weaver birds found firstly busy for the nest construction then it is singing a song for the female to attract but female weaver birds choose the nests to select the male weaver birds for the reproduction that has good quality nest with firm attachment with the tree branch and firmly weaved nest.

The quality of nest is responsible for the selection of male for the mating, here in this bird the song of male bird and its display of bright yellow colored wings has secondary importance for the female during nest choice. Kumar and Vyas (2005), Ferguson and Seigfried (1989) have explained the use of Baya weaver nests in pottery and crop protection in Rajasthan. A number of biotic and abiotic factors responsible for the destruction of the nests. The biotic factor like man is responsible for the destruction of the nests. Other nests destruction factor like lopping on trees, harvesting tree leaves for the fodder to cattle, for thatching on hut roofs and use of nests for the decorative purpose were found in various parts of India where as in the present study, the nest are destructed by shepherds who shake the tree branches to remove pods and leaves for as fodder to Sheep and Goats.

### **Conclusion**

Baya weaver (*Ploceus philippinus*) build typical type of ovoid or kidney shaped nest

with entrance tube on total 82 number of trees belong to 9 species belongs to 6 families in the selected study area. During monsoon nest construction complete within 18 days in the month of August to September. To construct the nest richly available only one grass species palm fronds was used. With the help of beak a thin fiber of leaf blades of 1 to 1.5 ft. lengths was used to weave the nests. To construct the nest of male Baya weaver performed its duties and attract the females for the mating and egg laying. The nest with compact, thick designed of weaving by using thin and long threads of grass leaf blades were selected for laying. Out of 435 nests 392 nests were complete nests, this indicates 392/10 km<sup>2</sup> was population of females (90% success rate of complete nests) but how many males exists in this area is not clear because one male may construct 1-3 nests during breeding season; due to unavailability of tagging materials, protocols and experience we could not reach to the conclusion for population of male Baya weaver in this area. Yellow color of plumage on the chest of the male was displayed to attracts females for nest selection. Nest designed and body coloration is the only two oriented used by the male of this bird for breeding and nesting success, these were the two factors for competition between two males to get the female. Thorny trees with more height were preferred for nest construction by this Weaver bird species.

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