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## NEST SITE SELECTION IN RED-VENTED BULBUL IN OLD CAMPUS OF UNIVERSITY OF LUCKNOW, UTTAR PRADESH, INDIA

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ABSTRACT: The nest and nest site characteristic is energy costing process. Nesting is the most significant stage of breeding in birds. It is directly related to reproductive success. The study was carried out in University of Lucknow was made during May 2017 to December 2017. The premises of Lucknow University are very rich in bushy plants like Ficus benjamina, Saraca asoca, Hibiscus rosa-sinensis Chandni plant (Tabernaemontana divaricata), Bottle brush (Callistemon), Manokamni (Murraya Paniculata), Thuja (Thuja occidentalis), Nejia (hedge). Total 14 nests recorded during the study. The relative height nest (Mean 4.86±1.406m), nest of bulbul is light weighted (Mean 0.07±0.267m) because the material for nest construction was dry. Red-Vented bulbul usually nested on relatively short plants (Mean nest-plants height 218.64±72.298m). Height from tree top to nest placement is (81.50±49.981m) and tree bottom to nest placement is (135.38±36.140m). The tree selected by birds with the total circumference is (Mean 295.64±84.185m) and nesting at a wide range of distances from the lateral edge of plants foliage minimum (Mean 44.00±20.046m), and the maximum range from viewers eye is (Mean 258.79±79.523m) range below or above of this range is risk of predator. They preferred mainly different types of tree, shrub for nest placement. The closed branching architecture with the protective thorns and high leaf density of above plants provide ideal condition for concealment of the nest from predators as well as prevention from harsh climatic conditions. In urban habitat, which is surrounded by crop field and wetland area with scattered vegetation, most of bird's species prefer nest site on Ornamental plants, hedges of gardens and vegetation. In case vegetation was not favorable, species preferred to nest on man-made structure like building, wire, telephone poles etc. Hence, presence of suitable nesting site play major role in the choice of breeding habitat which finally affect the breeding success.

Key Words: Nest, Nest Material, Nest sites, Placement, Predator.

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#### INTRODUCTION

Birds fluctuate a great deal from one another in most of their life pattern like habitat, food, colorations, breaks, feet, size, plumage pattern, distribution and so on, likewise nests of birds are also having huge variations in their size, shape, structure, construction material used, construction pattern, selection of site for nest, nest architecture etc. [26]. Nest sites are a source that has important fitness consequences for birds, influenced by a variety of factors, including nest predation risk, physiological tolerances to biotic factors [13] and inter specific competition [12, 6, 13, 5, 23, 18]. Nest site selection has strong effects on production and fitness of offspring [17] because in any healthy ecosystem the progeny and population are maintained in the habitat only when it breeds [26].

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Breeds are successful by the selection of sites for nest situation. Selection of unsuitable site jeopardizes reproductive investment as well as survival of the parents [9]. Therefore, potential nesting sites must provide concealment from predators [17, 9, 8], surplus and easy access of food [11,19] and protection from unsuitable weather conditions [21]. Identifying crucial factors involved in nest-site selection is essential for implementing conservation measures for bird and its habitat [20, 8]. Red vented bulbul is ecofrandily in nature with human always make nest in busy herb or shrub. Similar study also done by Bharat M.Vyas in 2009. he describe the breeding seasons and nest site selection of some selected urban birds of visnagar city area and its vicinity by given particular code number to the nest and observed nest activities. concluded that about 23% of birds observed nest on vegetation [26]. total 52 active nests recorded on forks of trees (*Azadirachta indica, Hibiscus rosasinensis, Morinda tinctoria, Kawsonia inermis, Commiphora caudate*) with the height of 2-4m from the ground [22].

The present study is focused on habitat characteristics of nest tree, nest site, terrain, sighting the nest, suitable nest dwellings, placement of nest on the basis of height of tree for particular birds suitable for nesting in University of Lucknow. The study provides the basic information about bird's nests placement, other key factors for nest constructions which can be helpful as references for such studies in other areas.

#### **Study Area**

The Lucknow district located in Uttar Pradesh in North India. The geographical coordinate of Lucknow is 26.88700 N to 80.94700 E. Lucknow has humid subtropical climate with cool and dry winters from mid November to February and dry hot summers from March to June and heavy rainfall during July to September. Winters are very cold and in summers (2<sup>o</sup>C to 48<sup>o</sup>C.), the situation is reverse. Study is carried out in University of Lucknow old campus which has humid subtropical climate. The campus is full of Floral diversity in form of various types of trees, shrubs herbs, hedges. The campus is also rich in avifaunal diversity which includes fifty-two bird species and small mammals.



Fig.1: Satellite Image of University of Lucknow (Old Campus)

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#### **MATERIALS AND METHODS**

The study took place in summer 2017 in University of Lucknow, Uttar Pradesh, India. Nests of the red vented bulbul were discovered by systematic searching, as well as by noting parental behavior and tracking breeding pairs during the nesting period [16]. Nests were numbered when found and recorded with a hand-held GPS unit (Garmin). Nest-site characteristics were measured after termination of nesting. Plant species used as the nesting substrate, height of the nest above the ground, from the top of tree, circumference of tree at the place of nest placement and height of the nest tree were measured by meter stick, or by ocular estimation of trees. Orientation of the nest relative to the core stem was documented in 45<sup>0</sup> octants. Nest concealment was observed by percent foliage cover in a 25-cm circle centered on the nest from a distance of 1 m from above and from the side in each of the four cardinal directions. We recorded all measurements only after each nest had failed or succeeded, in order to minimize human disturbance. Random sites were searched to confirm the absence of red vented bulbul nest. The photographs were taken with 700D canon Camera. All the measurement was determined by using a measuring stick. Kendall's tau\_b Method of Correlation Coefficient calculated by using IBM SPSS software version 20.

#### **RESULT AND DISCUSSION**

**Nest site selection:** Red vented bulbul prefers to nest at sites close to human habitation with few trees, more shrubs. Nests were observed on *Ficus benjamina, Sraca asoca, Nejia hedge, Hibiscus rosa sinensis* (table no.1; fig. 2 A-R). Maximum nests of Red vented bulbul were found on Ficus tree which being bushy thorny plants might aid in protecting nests from predators [4, 8, 1]. The use of short and thorny plants for nesting has been reported in Red-vented Bulbul, White browed Bulbul, Red-whiskered Bulbul and Grey-headed Bulbul in different forests in South India [24, 25]. Similar observations were made in Styan's Bulbul *Pycnonotus taivanus* in Taiwan [10].

Nest site selection Parameters: Total 14 nests observed on Ficus benjamina, Sraca asoca, Nejia hedge, Hibiscus rosa sinensis. The height of the plants in which nests were placed in or under, also differed significantly among the species. Red-Vented bulbul usually nested in relatively short plants (Mean nest-plants height 218.64±72.298). Height from tree top to nest placement was (81.50±49.981) and tree bottom to nest placement was (135.38±36.140). Although most of the species were generalists, bulbul selected shrub tree for nesting of total circumference is (Mean 295.64±84.185) and nesting at a wide range of distances from the lateral edge of plants foliage minimum (Mean 44.00±20.046), and the Maximum range from viewers eye was (Mean 258.79±79.523) range Below or above of this range has risk of predator (table no-2) Like red vented bulbul Cape Bunting, Greybacked Cisticola, Karoo Robin, Yellow Canary, Grass bird, and Bar-throated Apalis often nested near the lateral edge of plant foliage (Mean distances). Nest place within the building usually face high nest predation pressure. With daily nest predation risk. In Red-Vented Bulbul concealment was low probably because protection was compensated by busy and thorny plants with lateral entrance shown in [1]. Nest height use by Black Bulbul was much lower than reported [2]. It constructed nest in short bushes inside dense undergrowth vegetation with shrub cover. Low height nest with within the dense undergrowth protects eggs or chicks from cold or windy weather conditions prevalent in the breeding habitat [1]. This kind of habitat provides concealment to the nest from higher risk of predation and anthropogenic disturbance [7]. The leaf of the herb and grasses used for nest building are available only during monsoon which probably restricts their breeding to this period alone [3].

Nest predation is the major cause of reproductive loss in most land birds [14,15], It is considered as the strongest selective force in nest-site selection. Red-Vented bulbul selects cryptic and safer nest sites to avoided or minimized nest predation [23], most bird select nest sites that reduce the probability of clutch predation.

Every birds present on earth have need home and shelters during breeding season. substrate type used for nest construction is important for strapping of nest. It use leaf twig of Neem Tree, threads of Coconut tree, dry grass leaves. Base of nest prepared by making triangle of sticks and place leaf at bottom. Bulbul make nest for the egg laying at relative nest height (Mean  $4.86\pm1.406$ ), nest of bulbul is light weighted (Mean  $0.07\pm0.267$ ) because it used most of the material for nest construction is dry. Mean of nest shown in (table no.3. fig no.3). Scatter plot of mean shown in fig. no-4. We calculate correlation coefficient between total tree height and height of nest placement from top to nest and bottom to nest (table no.4, 5) by using Kendall's tau\_b Method, Scatter plot shown in (fig no. 5, 6).

Ashok Tree Ashika, Sorrow-I	Polyathia ess longifolia	Plant is used as decorative addition to	Bark astringent used in
Sorrow-	ess longifolia	decorative addition to	utamic infactions hast
		home or garden	tonic for female, seeds
			are strengthening and
			rheum- arthritis.
Bottle brush Shrub Bottle     Brush	callistemon	Leaves used in decoration in	Considered antibacterial, anthelminthic,
		horticulture,	hemostatic, diuretic for relieving problems of urinary tract,
Chandani Evergreen Pinwhee	Iflow <i>Tabernaemo</i>	Used as house and	They used in ayurvedic
shrub er, jasmine, india ros	east divaricata ebay	attractive flowers and foliage.	medicine and traditional medicine
Gurhal Herb Hibiscus     sinensis	rosa- Hibiscus or	Used to attract	It shows anti fertility
Sileisis	rose manow	hummingbirds, used in	effects in the form of
		paper making, as tea, food.	estrogen activity in rats,
Manokamni Evergreen Kamini     trag	Murraya Bani aulata	Used as an ornamental	Used in traditional
shrub	Faniculaia	not only food for bees	analgesic, the crude
		but as protection from	etanolic extract of leaves
		artificially propagated	antinociceptive, and anti-
• Saoni Shrub Commo	Lagerstroem	Popular nesting shrub	Bark. leaves and flowers
Creape	ia indica	for song birds and	are hydragogue and
Myrtle		wrens, it is also widely cultivated	drastic purgative. Bark
		cultivated.	febrifuge (Fever
			removing), seeds as
			Roots as astringent and
			as gargle.
• Thuja Coniferou Thujas cedars	or <i>Thuja</i> occidentalis	Used for hedges, wood used for making	Used as an externally applied tincture or
		chests, guitar sound	ointment for the
		boards, construction of bee hives Cedar wood	treatment of warts,
		oil and cedar leaf oil	and a local injection of
		also derived from thuja,	the tincture f
			or treatment of venereal
Ficus     Tree     Weeping	fig, <i>Ficus</i>	Used as a hedge or	The plant is a major
Benjami	n fig <i>benjamina</i>	clipped screen.	source of indoor

#### Table 1: Some common tree species used for nesting by Red-vented bulbul

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Parameters	N	Minimum	Maximum	Mean	Std. Deviation
Total height (Z) in cm	14	107	363	218.64	72.298
Height in cm from bottom To Nest (X)in cm	14	84	231	135.36	36.140
Height in cm from top to nest (Y=Z-X) in cm	14	23	160	81.50	49.981
Minimum depth in canopy from Viewers eye in cm	14	14	100	44.00	20.046
Maximum depth in canopy from Viewers eye in cm	14	171	446	258.79	79.523
Circumference in cm	14	204	493	295.64	84.185
Valid N (listwise)	14				

#### **Table 2: Showing Mean and Standard Deviation of Tree Parameters**

#### Table 3: Mean and standard deviation of Nest Parameters

Parameters	Ν	Minimum	Maximum	Mean	Std. Deviation
Outer C.	14	28	107	41.79	26.667
Inner C.	14	18	68	27.93	16.227
Weight	14	0	1	.07	.267
Height	14	2	8	4.86	1.406
Width	14	8	14	10.57	1.828
Depth	14	3	6	4.14	.949
Diameter	14	4	8	6.00	1.177
Valid N (listwise)	14				

#### Table 4: Correlations between Total tree height and height from top to nest

			8	
			Total height	Height from
			(Z) (cm)	top to nest
				(Y=Z-X) (cm)
Kendall's tau_b	Total height (Z) (cm)	Correlation Coefficient	1.000	.824**
		Sig. (2-tailed)		.000
		Ν	14	14
	Height from top to nest (Y=Z-X) (cm)	Correlation Coefficient	.824**	1.000
		Sig. (2-tailed)	.000	
		Ν	14	14

\*\*. Correlation is significant at the 0.01 level (2-tailed).

		0	0	
			Total height	Height from
			(Z) (cm)	bottom To
				Nest (X) (cm)
Kendall's tau_b	Total height (Z) (cm)	Correlation Coefficient	1.000	.516*
		Sig. (2-tailed)		.010
		Ν	14	14
	Height from bottom To Nest (X) (cm)	Correlation Coefficient	.516 <sup>*</sup>	1.000
		Sig. (2-tailed)	.010	
		Ν	14	14

#### Table 5: Correlation between the Total tree height and height from bottom to nest

\*. Correlation is significant at the 0.05 level (2-tailed).



Fig. 3: Showing Mean Line Graph of Nest height, Width, Depth, Diameter, Outer and inner Circumference



Fig No-4 Showing Scatter plot of nest Parameters



Fig. 5: Scatter Plot between Total Tree Height and Height from top to nest



Fig. 6: Scatter Plot between Total Tree Height and Height from bottom to nest

#### CONCLUSION

The closed branching architecture with the protective thorns and high leaf density of these plants provide ideal condition for concealment of the nest from predators as well as prevention from harsh climatic conditions. In urban habitat, which was surrounded by crop field and wetland area with scattered vegetation, most of bird's species prefer nest site on Ornamental plants, hedges of gardens and vegetation. In case vegetation was not favorable, species preferred to nest on man-made structure like building, wire, telephone poles etc. They preferred mainly different types of tree, bushy shrub and shrub for nest placement.

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