International Journal Of

Recent Scientific Research

ISSN: 0976-3031

Volume: 7(11) November -2015

ECOLOGY AND NEST-SITE CHARACTERISTICS OF THE YELLOW-EYED BABBLER CHRYSOMMA SINENSE IN THE TROPICAL FOREST, TAMIL NADU, INDIA

Nirmala. T

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 6, Issue, 11, pp. 7322-7330, November, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

ECOLOGY AND NEST-SITE CHARACTERISTICS OF THE YELLOW-EYED BABBLER CHRYSOMMA SINENSE IN THE TROPICAL FOREST, TAMIL NADU, INDIA

Nirmala. T

Jayaraj Annapackiam College for Women (Autonomous) Periyakulam Theni Dt.

ARTICLE INFO

Article History:

Received 05th August, 2015
Received in revised form
08th September, 2015
Accepted 10th October, 2015
Published online 28st November, 2015

Key words

Ecology, Nest-site characteristics *Chrysomma sinense,* scrub forest and breeding

ABSTRACT

Chrysomma sinense sinense breeds only in the scrub forest and the success was only 25% during 1999-2001. To provide the feeding and breeding biology especially nest-site characteristics of the Yellow-eyed Babbler in tropical forest, India. Field observations on feeding and foraging behaviour, estimation of insect availability and breeding strategy by opportunistic and behavioral methods in 5ha area.

The Yellow-eyed Babbler is distributed mainly in the Scrub forest where C.odorata, L.camara and P.indica are more. Four plant species have been selected by this bird to feed on the preferred height between 0 and1m, fed mainly on insects by gleaning on twig partly on leaf, from the middle and edge than center of the horizontal strata of the plant. Altogether, 35 nests were observed. Of the 28 successful nests studied 21 were built in Chromolaena odorata and 7 in Pavetta indica. There existed two breeding seasons from October to January with peak in November and April to June. Average clutch size was 3.4+ 0.6 and preferred more of C. odorata (75%) and less of P. indica (25%) for nesting. Both parents participated in all the nesting activities. Incubation and nestling period was about 13 and 12-13days respectively.

Predation, anthropogenic pressure along with cattle grazing which has to be arrested. YEB appeared to select scrub forest as the specific nest-sites; hence the landscape is important for the conservation of this species before it becomes included in the IUCN Red Data Book list.

INTRODUCTION

Among the three subspecies of the Yellow-eyed Babbler (YEB), Chrysomma sinense sinense restricted its distribution in Deccan plateau (Ali and Ripley, 1987). In India, studies have been made very limited on foraging of a single species or a particular family (Vijayan, 1975; Khan, 1980; Yahya, 1988; Vijayan, 1984; Zacharias and Mathew, 1988; Vijayan, 1990; Thiyagesan, 1991; Santharam, 1995). Also, the nesting requirements of birds are not examined except for studies conducted on Bulbul (Vijayan, 1975), Indian Peafowl (Johnsingh and Murali, 1980), Weaver Birds (Mathew, 1975), Black and Orange Flycatcher (Khan, 1977), Black Drongo, (Shukkur 1978, Shukkur and Joseph, 1980) Babblers (Zacharias and Mathew 1988), Barbets (Yahya, 1988), Indian Cuckoos (Becking, 1981), Narcondam Hornbill (Hussain, 1984), Nilgiri Laughing Thrushes (Islam, 1994), Drongos (Vijayan, 1984), Yellowbrowed Leaf Warbler (Price and Jamdar,1991), Crow-Pheasant (Natarajan, 1997), Bay-backed Shrike (Gokula, 2000) and Spotted Munia (Gokula and Vijayan 2001).

Unlike other members of the Family: Muscicapidae (Sub-family: Timaliinae), it is little known and there exists a very little information on its ecology. Only brief description is available in Ali and Ripley (1987). Although, size, shape and colour of the eggs (Baker, 1934), species sighted in Kerala (Neelakantan, 1988), single nest sighted (Biddulph 1956a), social behavior (Gaston, 1978a) and feeding substrate (Gokula, 1998), were made on this species. Detailed study on the breeding and feeding behavior of the YEB such as the nature of the nest, nesting materials, nesting plants, nest-site characteristics, type of feeding, method of feeding, and other particulars were not given in detail. The present study describes the breeding and feeding biology in detail, based on the fieldwork during 1999-2001.

The study was undertaken in the Scrub Forest (SF) and the Mixed Dry Deciduous Forest (MDDF) in Anaikatty Reserve Forest, foothills of Nilgiri Biosphere Reserve in the Western Ghats, situated at an elevation of about 610-1200m above MSL (Map and Photo 1). The Anaikatty forest is located between Attapady and north east of Coimbatore and is about 25km from Coimbatore. This is an undulating terrain comprising the foothills and hills, situated between 76^0 39' and 76^0 47'E and from 11^0 5' to 11^0 31'N in Coimbatore, TamilNadu, Southern India. The total area of Anaikatty Reserve Forest is 4447.74 ha

Corresponding author:* **Nirmala. T
Deppartment Jayaraj Annapackiam College for Women (Autonomous) Periyakulam Theni.

(2292.08 ha of south division and 2155.66 ha of north division) and the area of SACON is 55 acres.

The breeding site is restricted to the SF. The study area has dense and degraded scrub abutting MDDF. The major trees and shrubs here are Chloroxylon swietenia, Mundulea sericea, Albizia amara, Diospyros ferrea, Cassia fistula, Chromolaena odorata, Clausena indica, Elaeodendron glaucum, Flacourtia indica, Lantana camara, Opuntia dilleni, Ipomea staphalina, Randia dumetorum, Premna tomentosa, Pavetta indica, and Eupha antiquorum.

METHODS

Feeding biology

To determine the food of this species, emphasis was given to field observation rather than stomach content. Foraging records were collected at the study site during May 1999 to April 2000. The observations were made throughout the year using a day per month. Only the initial record was taken to encounter as done by Mac Nally (1994). For each foraging attempt, microhabitat details such as the vertical height above ground level, the horizontal distance from the center of the plant (stem), substrate, and foraging methods were recorded.

Foraging height

Foraging attempts were assigned to 12 height categories: 0 m (ground), and at every 1 meter interval up to 10, and >10 m based on the general physiognomy of the vegetation. Few trees were selected and marked with heights and were used for reference.

Foraging substrate: A substrate is the material from which food is taken by the birds. Substrates were classified as (1) ground - including debris, litter and grass (2) trunk/main branches - the main axes of trees (3) foliage - leaves including leaf-blades and petioles (4) twigs - small branches, (5) flowers, (6) fruits, and (7) air.

Foraging methods

Foraging methods of insectivorous birds were broadly categorized as follows: (1) Glean: a stationary food item is picked from its substrate by a standing or hopping bird, (2) Probe: only the bird's beak penetrates or lifts the substrate to locate the concealed food, (3) Pounce: a bird flies from a perch and grabs the food item as it lands on the substrate which is similar to flycatcher-gleaning, (4) Sally: a bird fly into air from perch to catch the flying prey or sedentary prey and returned to perch to feed on and (5) Hovering or fly catching: hover to catch the flying prey.

The method "gleaning" was classified into eight categories based on the location of the prey (Table 1). In total, 20 categories were used to collect information on foraging which encompasses the behaviours described by Crome (1978) and expanded by Holmes *et al*., (1979) and MacNally (1994). Moreover minimum 30 independent observations are recommended to represent the behaviour of a bird accurately (Morrison 1984), but in this study, 116 observations were made to authenticate the behaviour of the Yellow-eyed Babbler.

Table 1 Definition of eight gleaning activities used to assess guild structure of the Yellow-eyed Babbler

S. No.	Activity - Definition
1	Leaf-glean (Gleaning of perched prey on leaves of the plant)
2	Twig-glean (Gleaning of perched prey on twigs of the plant)
3	Wood-glean (Gleaning of perched prey on trunks or main branches)
4	Secondary branches glean (Gleaning of perched prey on fine/auxiliary branches)
5	Flower-glean (Gleaning of perched prey on flower)
6	Fruit-glean (Gleaning of perched prey on fruit)
7	Ground-glean (Gleaning of prey from the ground)
8	Litter-glean (Gleaning of prey from Litter)

Table 2 Nest-site characteristics of the Yellow-eyed Babbler

Variables	Mean ± SD
Nest-tree height (m)	1.94 ± 0.55
Canopy above the nest (%)	38.9 ± 29.6
Nest-tree GBH (cm)	4.5 ± 2.05
Nest height (m)	1.09 ± 0.24
Clutch size	3.04 ± 0.92
Nest depth	5.39 ± 1.03
Nest diameter (cm)	5.43 ± 1
Distance to the road/path (m)	19.4 ± 23.2
Distance from nearest tree (m)	9.74 ± 7.18
Nest concealment (m)	1.13 ± 0.35
Ground cover (%)	52.3 ± 15.5
Plant canopy (%)	4.27 ± 1.28
Shrub cover (%)	37.3 ± 9.98

Insect Abundance

Sweep net and knock down (Southwood, 1971) methods were adopted to determine the insect abundance. Efforts were concentrated on random collection of insects from the plants on which it feeds on. To estimate the total abundance of insects, data were collected in every fortnight

Breeding biology

The study area was visited almost everyday during the breeding season to locate the nests by opportunistic and behavioral methods. It was done both by scanning the 5 ha area intensively, everyday with minimum of 6 hours and observing the birds carrying nest material or food for the nestling. During the nesting period, *C. sinense* gave alarm calls at the approach of the observer near the nesting area, which also provided a cue to the nesting site. When the nest was located, the following data were recorded: nesting plant, height of the plant, height of the nest from the ground, microhabitat, location of the nest in the plant and the area it covers for foraging.

RESULT

Foraging

The height preference of the Yellow-eyed Babbler (YEB) lies between 0 and 4m, mostly between 0 and 1 meter (Figure 1). YEB preferred mostly the edge middle and edge edge as their foraging canopy and least the center (Figure 2 and 2a). They used fine twigs to feed on. The substrates such as twigs (75%)

and foliage (25%) were predominantly used for foraging the insects (Figure 3), only one observation was on fruit which is negligible out of 116 observations. Insects from *C.odorata* (48%) were highly preferred followed by *L.camara* (30%), *P.indica* (9%), and *C.sweitinia* (5%). Very meager usage of *P.juliflora, F.indica*, *R.dumetorum* and *T.indicus* was also recorded (Figure 4). Major insects and other groups recorded from *C.odorata, L.camara, P.indica,* and *C.sweitinia* were Hymenoptera, Phasmida, Orthoptera, Dictyoptera, Anoplura, Diplura, Lepidoptera, Coleoptera, Hemiptera and Arachnida (Figure 5). In all the four plant species arachnida was the dominant arthropod available for YEB. Orthoptera and Lepidoptera were high in *P.indica,* Hymenoptera and Phasmida in *C.odorata* Hymenoptera, Hemiptera and Lepidoptera in *L.camara* and Hymenoptera, Coleoptera and Hemiptera in *C.sweitinia*. Hymenoptera and Lepidoptera were carried from these plants by YEB while feeding the young ones.

Arthropod abundance showed a major peak in January followed by November, December and April in *L.camara, P.indica, and C.sweitinia* except *C.odorata* (Figure 6). Also abundance showed an increasing trend from October to January in *P.indica* which is preferred by the YEB, whereas it is from September to January in *L.camara, and C.sweitinia,* and in *C.odorata,* it is from August to November (Figure 6). The overall insect abundance fluctuated much and showed a definite trend in the years 1999-2001. All the sampling methods together showed a definite trend and peak during January with a minor peak in September and April in the scrub forest (Figure 7). The total abundance showed significant variation between the seasons ($F = 1567.58$, $P < 0.001$) and between years ($F = 24.05$, $P < 0.001$). The lowest abundance recorded was in June and August.

Breeding

Nest and nest-site characteristics

Altogether 35 nests of the Yellow-eyed Babbler (YEB) were observed in the scrub forest (SF) and 28 nests were taken for analysis. Even-though dense thorny mixed dry deciduous forest (MDDF) is adjuvant to the SF, there was not even a single nest in MDDF.

YEB placed the nest at the junction of the main bifurcated branches so as to get a firm support at the bottom. The nests are easily distinguished with a definite deep statant cup, and were built with grass, rootlet and fully lined by cobweb outside, which gives the appearance of cemented outer layer. Leaves softened the inner base. Apparently the nest has been located more towards the center of the plant and confined itself to the interior of the bush (Plate 1). The statant cup nest was placed at the height of 1.09 ± 0.24m. The nest tree height showed 1.94 ± 0.55m (Table 2) with a mean girth at breast height (GBH) of 4.5cm. Nests were concealed upto 1.13 ± 0.35m. Although the plant height in SF was >2m, the YEB preferred only <2m height with more ground cover and shrub cover. It did not prefer the shrubs nearest to the trees. (Table 3). because predators such as Shikra, Blakckwinged Kite etc. hovers above to prey.

Tree height and tree GBH showed significant variance (Anova) to prefer the nesting sites. Other variables such as distance from the nearest tree, plant canopy, distance to the road or path, ground cover and shrub cover were not significantly different between the nest-site and random sites (Table 3). The first three principal components were selected which accounted for 62% of the total variance. The first component was highly associated with nest diameter, nest depth, shade over the nest and distance to road (Table 4). The second component was associated with the nest height and plant canopy. The third component was also associated with nest height and nest tree GBH. The factors highly correlated with these three components were directly related to the position of the nest on tree including cover in nest-site selection.

Table 3 Comparison of Nest-site variables of the Yellow-eyed Babbler with random sites

Parameters	Nest site (n = 25)	Random site (n = 25)	Significance p
Tree height (m)	1.94 ± 0.55	2.1 ± 0.6	0.032
Tree GBH (cm)	4.5 ± 2.05	11.81 ± 7.8	0.000
Distance to the road/path (m)	19.4 ± 23.2	9.9 ± 16.7	0.165
Distance from nearest tree (m)	9.74 ± 7.18	7.9 ± 12.4	0.167
Ground cover (%)	52.3 ± 15.5	45 ± 17	0.610
Plant canopy (%)	4.27 ± 1.28	5.95 ± 4.4	0.106
Shrub cover (%)	37.3 ± 9.98	34.8 ± 11.9	0.659

Table 4 Factor loading of the nest site characteristics with the first three principal components in the Yellow-eyed Babbler

Variables	PC I	PC II	PC III
Nest tree height	0.28	0.40	0.30
Shade over nest	0.59	-0.39	-0.19
Nest concealment	0.20	0.35	-0.55
Nest diameter	0.81	-0.31	0.21
Distance to road	0.68	-0.40	0.37
Nest tree GBH	0.41	0.34	0.48
Ground cover	0.45	0.07	-0.59
Distance to nearest tree	-0.07	-0.69	-0.06
Nest depth	0.59	0.12	0.25
Nest height	-0.24	0.67	0.56
Plant canopy	0.25	0.67	-0.28
Shrub cover	-0.51	-0.55	0.31
Total	2.66	2.51	1.75
% of Variance	22.19	20.89	14.54
Cumulative %	22.19	43.08	61.62

Nesting plants

The most favored plant for nesting was *Pavetta indica* followed by *Chromolaena odorata, Lantana camera and Carmona retusa* (Figure 8*)*. Invariably these plants were preferred always in combination with *Lantana camera.* Moreover, it had more nests on *Pavetta indica* followed by *Chromolaena odorata* and showed preference of species in preference test (Table 5).

Table 5 Nest tree preference by Yellow-eyed Babbler in the scrub forest

Plant species	*Observed usage*	Expected usage	Upper confidence limit
C. odorata	10	128.8	0.584
C. retusa	1	38.36	0.123
L. camara	4	134.4	0.308
P. indica	13	28.84	0.7

Table 6 Relationship of insects and nests in different plant species during 1999-2000

Plant species	Correlation coefficient
L. camera	-0.05
C.sweitiana	-0.07
C. odorata	0.3
P. indica	0.2

Insects from *Pavetta indica* and *Chromolaena odorata* showed positive correlation with number of nests of YEB, whereas the other two plants was negatively coorelated (Table 6).

Breeding season

Altogether, 35 nests were observed only from the scrub forest. Although YEB was recorded from both the forests during census, it did not breed in the mixed dry deciduous forest. There were two breeding seasons, October to January and April - June with a major peak in November as the area had little shower during these months (Figure 9) and abundance of insects were also high (Figure 6). The breeding season showed positive correlation with the abundance of insects (r = 0. 601, p = 0.030), Coleoptera (r = 0. 482, p = 0.050), Neuroptera (r = 0. 568, p = 0.043) and Odonata (r = 0. 573, p = 0.041) which were used to feed their young ones.

Breeding biology

Altogether 35 nests of the Yellow-eyed Babbler (YEB) were observed in the scrub forest (SF) and 28 nests were taken for analysis. Mostly three (n = 19) and four (n = 9) eggs were laid. Clutch size varied between 3 and 4. Colour of the egg is pinkish white, thickly marked all over with chestnut red. Eggs were laid on the consecutive days. Incubation period was 12-13 (n = 24) and nestling period 12-13 (n = 14) days as recorded by Nirmala and Vijayan (2000). Both parents participated in all the nesting activities. The total number of eggs laid were 85, of this hatching success was only 50%. In total, 25% of nestling fledged successfully. Only 7 nests showed success in bringing out fledglings.

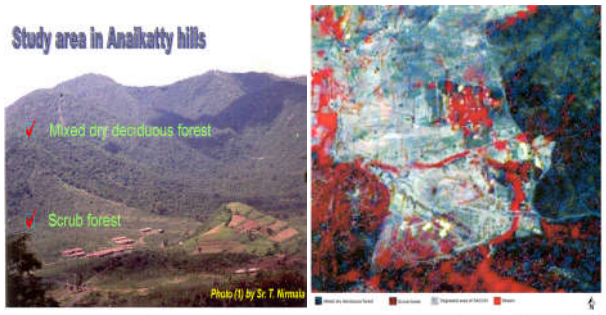
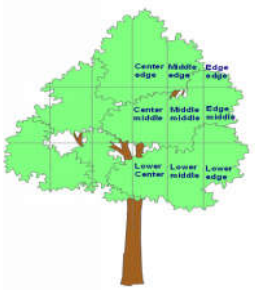


Plate 1 Habitats showing different vegetation type in the Anaikatty hills

Plate 2 Parent and nestlings of the Yellow-eyed Babbler in the scrub forest



Plant species showing different portions such as Center, Middle and Edge of the canopy on one side.

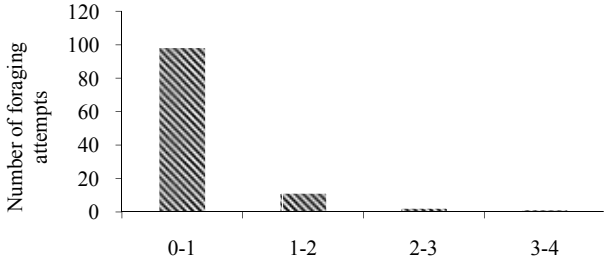


Figure 1 showing the number of foraging attempts made by the Yellow-eyed Babbler in different vertical classes from 0meter to 4meter height out of 116 observations.

Frequency of foraging (c-center, m-middle,e-edge)

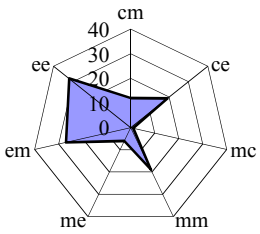


Figure 2 Frequency of feeding on the plant canopy at different portion of the plant such as center, middle and edge.

Figure 3. Percent of foraging substrate of the Yellow-eyed Babbler (n=116)

Figure 3 The preference of twig and leaf as the foraging substrate of the Yellow-eyed Babbler

DISCUSSION

Foraging

YEB feeds in lower strata and fine twigs on the edge of the shrubs in scrub forest (SF) habitat. It is proposed that the food is an important limiting factor/resource (Lack, 1933, 1968; Cody, 1974) and this was tend to partition the species in the

physical structure of a habitat. Although 119 plant species (Nirmala, 2002) are available in this forest, it feeds only on eight plant species.

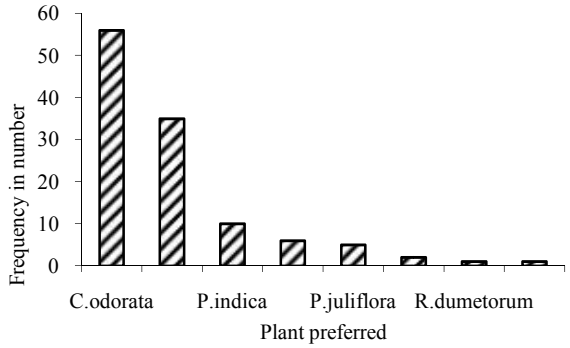


Figure 4 Foraging frequency of Yellow-eyed Babbler feeding on the preferred eight plant species such as *C.odorata, L. camara, P.indica, C.swietenia, P.juliflora, F.indica, R.dumetorum* and *T.indicus*

Figure 5. Abundance of Arthropod community in the four selected plant species

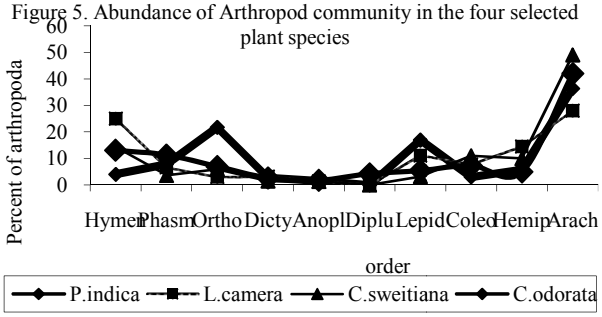


Figure 5 Percent of abundance of arthropod community in the four highly preferred plant species. Major orders of Arthropod recorded from *C.odorata, L. camara, P.indica and C.swietenia* were compared

Figure 6. Seasonality of Arthropod abundance in four different plant species

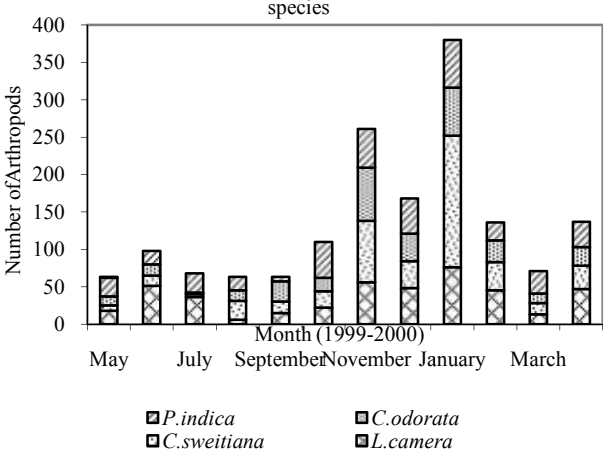


Figure 6 Temporal fluctuation of total arthropod abundance in the *C.odorata, L. camara, P.indica and C.swietenia*

C.odorata was highly preferred because of the availability of insects that are abundantly seeen. No predation of the adult birds was recorded during the study period. The risk of predation may affect how long the birds forage and the sites on which they forage (Lima, 1985). In general, Ali and Ripley (1987) described only the major foraging method such as glean, hawk and pounce. Feeding method of YEB is gleaning mainly on the shrubs. Arthropod abundance and diversity affect foraging behaviour of insectivorous birds (Holmes and Schultz, 1988; Cole, 1995). The food plants on which larvae develop are often determined by the preference of the adult prior to oviposition (Fitch, 1958) and increasing the total time spent for foraging (Zalik and Strong 2008) in particular plant species.

Figure 7. Abundance of Arthropod in the Scrub Forest

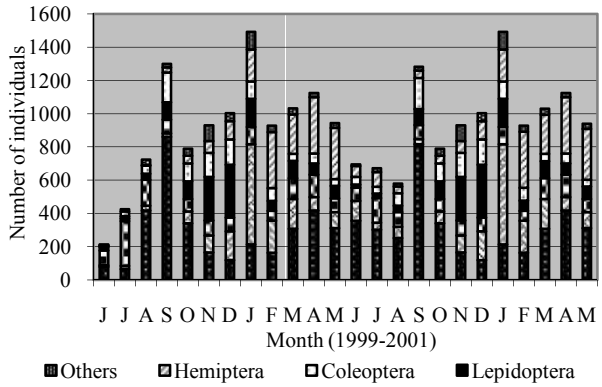


Figure 7 Using Aerial trap, pitfall trap, light trap, Sweep sampling, visual count and knockdown methods, abundance of arthropods were estimated in scrub forest.

Figure 8. Percent of nests of the Yellow-eyed Babbler in plant species (n=28)

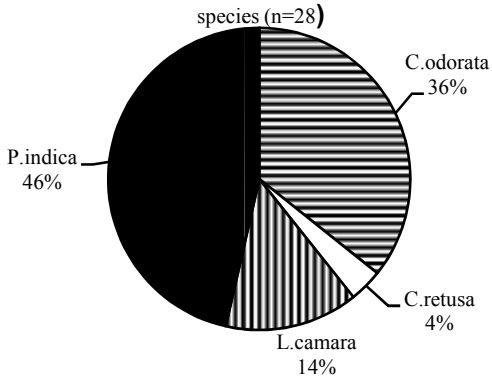


Figure 8 The yellow-eyed Babbler preferred plant species such as *C.odorata, L. camara, P.indica* and *C.retusa for nesting of 28 nests.*

Figure 9. Breeding season of the Yellow-eyed Babbler in the Scrub Forest

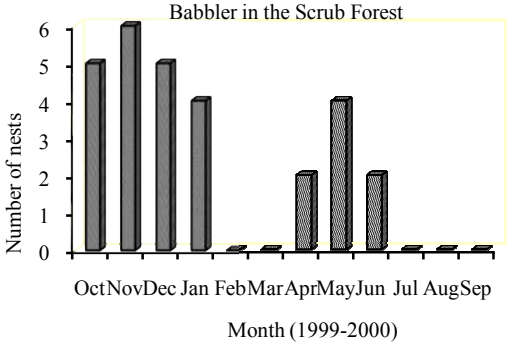


Figure 9 Number of nests of the Yellow-eyed Babbler recorded in the scrub forest between October 1999 and September 2000 showing two breeding seasons. Hatched bars indicate the number of nests in different months

Arthropods recorded from the four plant species were Hymenoptera, Phasmida, Orthoptera, Dictyoptera, Anoplura, Diplura, Lepidoptera, Coleoptera, Hemiptera and Arachnida. Arachnid was the dominant anthropod studied elsewhere. Orthopterans are one of the most important food sources of many of the insectivorous birds. YEB being an inseetivorous bird preferred *P.indica* where orthoptera and lepidoptera was high. Hymenoptera and Lepidoptera were carried by YEB while feeding the young ones. It feeds the nestlings with

caterpillar and other insects for every minute upto 10 o'clock in the morning and the frequency decreases later. In the study of Arun (2000), where moist decidious forest of Siruvani in Nilgiri Biosphere Reserve showed bird abundance was found significantly correlated with the orthopteran abundance indicates that the seasonality of bird abundance depends with that of the abundance of orthoptera. Tinbergen (1960) recorded the same frequency with which small insectivorous birds, especially the Great Tit (Parus major), brought insects of different species to their young.

Lepidoptera was high in *P.indica* and *L.camara.* The rainfall benefits the caterpillar abundance indirectly by causing the sprouting of new leaves which form the major food source of caterpillars. These caterpillars form the major food of young ones of YEB. Hymenoptera was the most abundant insect group from the three shrub species such as *C.swietinia*, *C.odorata* and *L.camara,* and is the most abundant group in SF as in the study of Arun (2000) in moist deciduous forest of in Siruvani. The fotrage density of the vegetation is likely to have an effect on the abundance of hemipterans. Arthropod abundance showed a slow increase from September, October, November, December and highest in January and in April. A relative measure of arthropod biomass increases throughout the nesting season (Zalik and Strong 2008). The insect abundance increased as the rainy season progressed in Anaikatty hills (Nirmala and Vijayan 2003) as in the study of Murali and Sukumar (1993). Abundance of insects during the southwest monsoon was lowest in both the habitats unlike the study from the tropical evergreen forest of Point Calimere (Vijayan 1975) and moist deciduous forest of Thekkady (Vijayan 1984) and Siruvani (Arun 2000).

Breeding

Of the 35 nests observed, 28 nests were used for analysis. Although YEB was recorded from MDDF no nest was found here. But all the nests were only from SF. This shows that Yellow-eyed Babbler is habitat specific to breed in the SF. Partridge (1974) experimentally proved that the habitat preference was 'genetically determined' and could be taken to imply that the development of the mechanisms controlling the behavior could have been evolved with the environmental factors. The presence of these individuals of species is an indicator of environmental quality (Kiester and Slatkin 1974). Architecture of the nest plant species was convenient to construct the statant cup nest which has been located on mere center of the plant at the junction of the main bifureated branches. Apparently the nest has been located more towards the center of the plant and confined itself to the interior of the bush. The three sides of the rim of the nest are attached to the adjoining branches. The possible adaptive significance of Yellow-eyed Babbler nesting in the main axis of the plant is because of i. the clutch size is three to four, which needs stronger support for the nest. ii. To feed three or four chicks, the visits of the parents are frequent and a nest in the center of a bush is more suitable for avoiding detection by the predator.

Moreover height of the same plant was available >2 meter height. The nest tree height and nest height plays a major role along with nest concealment which protects nests from predators. Nest type and nest height were important physical nest site covariates as in the study of Brown and Collopy (2008). Preference of more ground cover and shrub cover may be due to the food availability especially lepidopterans on herbs and shurbs. Also it didnot prefer nesting on the same plant species of shrubs nearest to the trees because it may have high visinity to the predators such as Shikra, Blakckwinged Kite etc. resting on those trees and hovers above to prey.

Tree height and tree GBH plays a major role in selecting these four plants for nesting. Also higher the distance to the road / path from nesting plant, greater the success of placing nest showed that the disturbance is low to the interior from the path / road. Other variables such as distance from the nearest tree, plant canopy, distance to the road or path, ground cover and shrub cover was not significantly different between the nest-site and random sites. Though these parameters were not significantly different, it was greater at nest sites than at non-nest sites unlike the study of Bulluck and Buehler (2008) where it is highly open. YEB selected nest sites away from the road as in the study of White-winged Scoters which often selected nest sites with dense cover far from water (Safine and Lindberg 2008). Nest site selection is also important in understanding population dynamics because nest location can affect nest (Martin 1993b, Filliater *et al*. 1994, Gloutney and Clark 1997) and cover at nest site can affect nest survival (Traylor *et al*. 2004).

The three principal components responsible for the success of nests are nest diameter, nest depth, shade over nest, distance to road, nest height, nest tree GBH and plant canopy. The factors highly correlated with these three components are directly related to the position of the nest on tree including cover in nest-site selection. Quantifying differences between nests and random sites has revealed patterns of habitat use that have improved survival of nests (Clark and Shutler 1999). P.indica, Chromolaena odorata, Lantana camera and Carmona retusa were preferred invariably always in combination with *Lantana camera* for all the nests undoubtedly protect the nests from predators as in the study of Collias & Collias (1984), and Gokula and Vijayan (2001) in the Spotted Munia. The availability of extensive branching system, suitable for placing the cup nests gives more security as found by Vijayan (1984) in the Drongos.

Although 40 ecological valued (Nirmala, 2002) plant species are available in scrub forest, YEB selected only four plant species for nesting and showed high preference in the preference test. It also used *Pavetta indica* and *Chromolaena odorata* as its successful nesting plant because of their architecture, branching system and canopy cover to provide better concealment of the nest. It's an insectivorous bird and it preferred the plant with more insects, so that it can feed on insects from while brooding in the nest. It rarely goes out to feed. Number of nests from *P.indica* and *C.odorata* increases with increasing abundance of insects while the C.sweitiana and L. camera was not preferred highly and showed negative correlation with insects. YEB showed cost benefit phenomena in preferring nesting plants. The selection of nest tree is highly

economical.

There are two breeding season which showed dependency on insect abundance. Although YEB was recorded from both the areas duing census, it has selected only SF for its breeding. Helle (1986) reported that openness of vegetation was the most important factor affecting habitat selection in bird population and this may be an adaptive response to reduce detection by nest predators (Safine and Lindberg 2008).

Only 50% of success in hatching and 25% of nesting success was observed in YEB. Description of the egg colour is the same as described by Ali and Ripley (1987). Of the 85 eggs laid, 50% and 25% of hatchling and nestling respectively resulted in success. Altogether seven nests broughtout the fledglings successfully. One or two eggs as they lay were predated also the bird removed the hatchlings from the nest as it saw the predator (snake) or the researcher. The primary nest defence behaviour of YEB was as in Carolina Wrens which produced alarm calls and spent more time alarm calling to the intruder or even the researcher suggesting that Cowbirds though it was not recognized as threats to the nest (D'orazio and Neudorf 2008), they depredate or remove the egg or the young ones from the nests as in the case of brood parasitism (Friedmann 1963, Rasmussen and Sealy 2006).

Although nest failure in birds can result from adverse weather, death of one of the attending adults, nest parasitism, anthropogenic disturbance etc. predation is responsible for the loss of 50% of eggs and nestlings in some passerine species (Ricklefs 1969). Murphy (1983) and Martin (1993a) have suggested that predation which is the primary cause of nest failure, should be the key factor influencing nest-site selection. Predation is due to disturbance and is a major cause of nest failure for songbirds (Reidy *et al*. 2008). Disturbance of researcher who introduced into the forest for nest searching also affect the nest success as in the study of Reidy *et al*. (2008) where the nest survival was slightly higher for camera monitored nests than for the nests without cameras. However relative predation risk depends on prey density (Mitchell and Brown 1990). Among many influencing factors predation is important because it affects survival probability of many passerines in temperate zones (Ekner and Tryjanowski 2008). Nest predator activity increases throughout the season by Falcons and anthropogenic pressure that existed by the children of Adivasi who entertain themselves during holidays by collecting the eggs and hatchlings from the nests and collect firewood regularly from this forest.

High percent of failure may be due to the nest placement (Tieleman *et al*. 2008) or vertical distribution of nests in plants (Zbigniewkasprzykowski 2008) or climatic fluctuation (Nevoux *et al*. 2008) or asynchronous hatching (Newbrey *et al*. 2008) or predation (Reidy *et al*. 2008). Moreover, the nest is wide open facing upward exposes to predict the presence of nestlings easily may be the reason for failure of fledglings.

Management Plan

Predation and anthropogenic pressure along with cattle grazing prevails in this forest. Predation is a natural phenomenon and it cann't be stopped but the anthropogenic pressure and cattle grazing can be arrested. YEB appears to select nest sites with specific habitat attributes and ensuring the presence of these nest-site characteristics in the landscape is important for the conservation of this species. Although it is a common bird and restrict itself to a specific habitat if it is not given care to protect, one day it may also disappear from the common bird list and enlisted in the "IUCN RED DATA BOOK" as a threatened bird. It is better to measure and taken care when they are at hand before declining. Keeping this in mind, this species is taken care by SACON after this study. The SF of SACON is protected from cattle grazing, firewood collection, anthropogenic pressure *etc*. and the same can be extended in other areas also.

Reference

1. Ali, S. and. Ripley S. D. 1987. Handbook of the birds of India and Pakistan. Compact edition, Oxford University Press, New Delhi. Oxford Univ. Press, New Delhi.
2. Baker, E. C. S. 1934. The game birds of the Indian empire, part 21. *J. Bombay nat. Hist. Soc*. 37(2): 245-254.
3. Becking, J. H. 1981. Notes on the breeding of Indian Cockoos . *J. Bombay nat. Hist. Soc.* 78(2): 201-231.
4. Biddulph, C.H. 1956a. The breeding period in the birds of South India. *J. Bombay nat. Hist. Soc.* 5 (3):697 .
5. Brown, J.L. and Collopy M.W. 2008. Nest-site characteristics affect daily nest-survival rates of Northern Aplomado Falcons (*Falco femoralis septentrionalis*). The Auk 125(1): 105 -112.
6. Bulluck, L. P. and Buehler D. A. 2008. Factors influencing golden-winged warbler (vermivora chrysoptera) nest-site selection and survival in the cumberland mountains of tennessee. The Auk 125(3):551-559.
7. Clark,R.G. and Shutler D. 1999.Avian habitat selection:pattern from process in nest-site use by ducks. Ecology 80:272-287.
8. Cody, M. L. 1974. Competition and the structure of bird communities. Princeton Monogr. In. Population Biology 7, Princeton Univ. Press, Princeton, New Jersey.
9. Cole, D. N. 1995. Experimental trampling of vegetation. II. Predictors of resistance and resilience. *Journal of Applied Ecology*. 32: 215-224.
10. Collias, N. E. and Collias, E. C. 1984. Nest building and bird behaviour. Princeton University Press, Princeton, New Jersey.
11. Crome, F. H. J. 1978. Foraging ecology of an assemblage of birds in lowland rainforest in Northern Queensland. *Aust. J. Ecol*. 3: 195-212.
12. D' orazio, K. A. and Neudorf D.L.H. 2008. Nest defense by Carolina Wrens. The Wilson journal of ornithology.120(3): 467-472.
13. Ekner, A. and Tryjanowski P. 2008. Do small hole nesting passerines detect cues left by a predator? A test on winter roosting sites. Acta Ornithologica. 43(1): 107-111

14. Filliater, T.S.,R.Breitwisch and Nealen P.M. 1994. Predation on Northern cardinal nests:does choice of net site matter? Condor 96:761-768.
15. Fitch, H.S. 1958. Home ranges, territories and seasonal movements of vertebrates of the Natural History Reservation. Univ. Kans. Publ. Mus. Nat. Hist., 11:63-326
16. Friedmann, H. 1963. Social parasitism in birds. Quarterly Review of Biology 3:554-569.
17. Gaston, A. J. 1978a. Seasonal occurrence of birds on New Delhi ridge. *J. Bombay. nat. Hist. Soc*. 75: 115-128.
18. Gloutney, M.L. and Clark R.G. 1997. Nest-site selection by Mallards and Blue-winged Teal in relation to microclimate. The Auk 114: 381-395.
19. Gokula, V. 1998. Bird communities of the thorn and dry deciduous forests in Mudumalai Wildlife Sanctuary, South India. *Ph. D. Thesis*, Bharathiar University, Coimbatore.
20. Gokula, V. 2000. Foraging and nesting behaviour of Bay-backed Shrike (*Lanius vittatus*) in Southern India. *J. South Asian Natural History*. 5: 97 –100.
21. Gokula, V. and Vijayan L. 2001. Nest-site characteristics of Spotted Munia (*Lonchura punctata*) in Mudumalai Wildlife Sanctuary, Southern India. *J. South Asian Nat. Hist*. 5(2): 187-190
22. Helle, P 1986. Forest bird communities: Habitat utilization in mature and successional phases. Acta XIX Congressus nternationalis Ornithologici, Vol. 1. Ottawa, Canada. 1: 22:-29.
23. Holmes, R. T. and Schultz J. C. 1988. Food availability for forest birds: effects of prey distribution and abundance on bird foraging. *Can. J. Zool*. 66: 720-728.
24. Holmes, R. T., Jr. Bonney R. E. and. Dalala S. W. 1979. Guild structure of the Hubbard Brook bird community: a multivariate approach. *Ecology*. 60: 512-520.
25. Hussain, S. A. 1984. Some aspects of the biology and ecology of Narcondam Hornbill (*Rhyticeros Narcondami*). *J. Bombay nat. Hist. Soc*. 81(1): 1-18.
26. Islam, M. A. 1994. Breeding habits of the Nilgiri Laughing Thrush *Garrulax cachinnans* (Jerdon). *J. Bombay nat. Hist. Soc*. 91:16-28.
27. Johnsingh, A. J. T. and Murali S. 1980. The ecology and behaviour of the Indian Peafowl (*Pavo cristatus*) Linn. of INIAR. *J. Bombay nat. Hist. Soc.* 75(1): 1069-1079.
28. Johnson, M. and Walters J.R. 2008. Effects of mate and site fidelity on nest survival of western sandpipers(calidris mauri). The Auk 125(1): 76-86.
29. Kasprzykowski, Z. 2008. Nest location within the tree and breeding parameters of Rooks *Corvus frugilegus*. Bird Study 55:59-65.
30. Khan, M. A. R. 1980. A comparative account of the avifauna of the sholas and neighboring plantations in the Nilgiris. *J. Bombay. nat. Hist. Soc*. 75: 1028-1035.
31. Kiester, A. R. and M. Slatkin (1974). A strategy of movement and resource utilization. *Theoret. Pop. Biol*. 6: 1-20
32. Lack, D. 1933. Habitat selection in birds. Journal of animal ecology. 2: 239 –262.
33. Lack, D. 1968. Ecological adaptations of reproduction in birds. Methuen, London.
34. Lima, S. L. 1985. Sampling behaviour of Starlings foraging in simple patchy environments. *Behav. Ecol. Sociobiol*. 16: 135-142.
35. MacNally, R. 1994. Habitat specific guild structure of forest birds in southeastern Australia: a regional scales perspective. J. Anim. Ecol. 63: 988-1001.
36. Martin, T. E 1993a. Nest predation and nest sites: new perspective and old patterns. BioScience. 43: 523-532.
37. Martin, T. E 1993b. Nest predation among vegetation layers and habitat types: revising the dogmas. *Am. Nat.* 141(6): 897-913.
38. Mathew, D.N 1975. Ecology of the Weaver Bird. *J. Bombay. nat. Hist. Soc.* 73: 250-260.
39. Morrison, M. L. (1984). Influence of sample size and sampling design on analysis of avian foraging behaviour. *Condor*. 86: 146-150.
40. Murali, K. S. and Sukumar R. 1993. Leaf flushing phenology and herbivori in a tropical dry deciduous forest, Southern India. *Oecologia*. 94: 114-119.
41. Murphy, M.T. 1983. Nest success and nesting habits of Eastern Kingbirds and other flycatchers. Condor,85:208-219.
42. Natarajan, V. 1997. Breeding biology of the Southern Crow-Pheasant *Centropus sinensis parroti* Stresemann (Aves: Cuculidae) at Point Calimere, Tamil Nadu. *J. Bombay nat. Hist. Soc*. 94: 56-63.
43. Neelakandan, K. K. 1988 Yellow-eyed Babbler Chrysomma sinensein Kerala. J. Bombay nat. Hist. Soc. 87 (1): 302.
44. Nevoux, M., JC. Barbraud and Barbraud C. 2008. Breeding experience and demographic response to environmental varibility in the White Stork. The Condor 110(1):55-62.
45. Newbrey, J.L., W.L.Reed, Foster S.P. and Zander G.L. 2008. Laying-sequence variation in yolk carotenoid concentrations in eggs of Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*). The Auk 125(1): 124 -130.
46. Nirmala, T. and Vijayan L. 2000. Foraging and breeding behaviour of the White – throated Babbler. pp18
47. Nirmala, T. and Vijayan L. 2002. Ecology of the Yellow-eyed Babbler. Proc. of Second Pan Asian Ornithological Congress. 27: 2.
48. Partridge, L. 1974. Habitat selection in titmice. *Nature, Lond*. 247: 573-4.
49. Price, T. D. and Jamdar N. 1991. Breeding biology of the Yellowbrowed Leaf warbler *Phylloscopus inornatus* in Kashmir. *J. Bombay nat. Hist. Soc.* 88(1): 1-17.
50. Rasmussen, J.L. and Sealy S.G. 2006. Hosts feeding only Brown-headed Cowbird fledgelings: where are thr host fledgelings? Journal of Field Ornithology 77:269-279.
51. Reidy, L.J., Stake M.M. and Thompson F.R. 2008. Golden-cheeked Warbler nest mortality and predators

in urban and rural landscapes. The Condor 110(3):458-466.
52. Ricklefs, R. E. 1969. An analysis of nesting mortality in birds. Smithsonian Contributions to Zoology 9:1-4.
53. Safine, D.E. and Lindberg M. S. 2008. Nest habitat selection of White-winged Scoters on Yukon flats, Alaska. The Wilson Journal of Ornithology. 120(3):582-593.
54. Santharam, V. 199). A note on the preliminary findings on the distribution of the Great Black Woodpecker in the Western Ghats. *Newsletter for Birdwatchers*. 35(4): 68-69.
55. Shukkur, E. A. A 1978 Biology, ecology and behaviour of the Black drongo, Dicrurus adsimilis. Ph. D. Thesis, University of Calicut, Kerala.
56. Shukkur, E. A. A. and. Joseph K . J 1980. Breeding biology of the Black Drongo. *J. Bombay nat. Hist. Soc*. 75: 1212-1226.
57. Southwood, T. R. E. 1971. Ecological methods with particular reference to insect populations. English Language Book Society. pp. 524.
58. Thiyagesan, K. 1991. Ecology of cavity nesting birds in and around Mayiladuthurai, Tamil Nadu, South India. *Ph. D. thesis*, Bharathidasan University, Trichirapalli.
59. Tieleman, B.I., Noordwijk H.J.V. and Williams J.B. 2008. Nest-site selection in a hot desert: Trade-off between microclimate and predation risk. The Condor 110(1):116-124.
60. Tinbergen, L. 1960 The natural control of insects in pinewoods.I. Factors influencing the intensity of predation by songbirds. Arch.Neer.Zool.13:265-336.
61. Traylor, J.J., Alisauskas R.T. and Kehoe F.P. 2004. Nesting ecology of White-winged Scoters Melanitta fusca deglandi at Redberry Lake, Saskatchewan. The Auk 121: 950-962.
62. Vijayan, L. 1984. Comparative biology of Drongos (Family: Dicruridae, Class: Aves) with special reference to ecological Isolation. *Ph. D. Thesis,* Bombay University, Bombay.
63. Vijayan, L. 1990. Feeding behaviour of the Malabar Woodshrike *Trephrodornis virgatus sylvicola* Jerdon at Thekkady, Kerala. *J. Bombay nat. Hist. Soc*. 86: 396-399.
64. Vijayan, V. S. 1975. Ecological isolation of bulbuls with special reference to *Pycnonotus cafer cafer* (Linnaeus) and P. luteolus in Point Calimere, Tamil Nadu. *Ph. D. Thesis*, University of Bombay. Bombay.
65. Vijayan, V. S. 1980. Breeding biology of bulbuls, *Pycnonotus cafer* and *Pycnonotus luteolus* (Class : Aves, family : Pycnonotidae) with special reference to their ecological isolation). *J. Bombay nat. Hist. Soc*. 75 : 1090 – 1117,
66. Yahya, H. S. A. 1988. Breeding biology of barbets, megalaima spp. (Capitonidae : ticiformes) at Periyar Tiger Reserve, Kerala. *J. Bombay nat. Hist. Soc.* 85 (3): 493 – 511.
67. Zacharias, V. J. and Mathew D. N. 1988. Ecology of Babblers. *J. Bombay nat. Hist. Soc*. 85: 50-64.
68. Zalik, N. J. and Strong A.M. 2008. Effects of hay cropping on invertebrate biomass and the breeding ecology of Savannah Sparrows (*Passerculus sandwichensis*). The Auk 125(3): 700 -710.

****

How to cite this article:
Nirmala. T., Ecology And Nest-Site Characteristics of The Yellow-Eyed Babbler Chrysomma Sinense In The Tropical Forest, Tamil Nadu, India. *International Journal of Recent Scientific Research Vol. 6, Issue, 11, pp. 7322-7330, November, 2015*

ISSN 0976-3031