

FORAGING BEHAVIOR OF BLACK DRONGO (*DICRURUS MACROCERCUS*) IN NALGONDA DISTRICT OF ANDHRA PRADESH, INDIA

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ABSTRACT

The present investigation is about foraging behavior of insectivorous bird species Black Drongo (*Dicrurus macrocercus*) in Nalgonda District of Andhra Pradesh, India. The study was carried out from December 2010 to March 2013. 1114 foraging observations bird used a variety of perch types for hunting the prey; in general the electric power lines was a frequent perch type used 63%, classified in to 3 meter categories up to 12 m height, perching heights (N = 1104) principally used 9-12 m and foraging heights (N = 466) 6-9 m 48 %. While the use of foraging substrate (N = 331) as plants 59% and aerial feeding (N = 151) were key feeding technique recorded 52%. In Perch types, perching and foraging heights, foraging substrates and foraging methods based on the above studies, it is recognized that foraging behavior of Black Drongo are mostly interlinked with habitat and accessibility of food resources.

INTRODUCTION

Vieillot (1817) described that Black Drongo (*Dicrurus macrocercus*) is a small passerine bird belong to the family Dicruridae, it is a common resident breeder in most of the tropical southern Asia (Southwest Iron, India and Srilanka and Indonesia). Ali (2010) reported Black Drongo is a wholly black bird with a distinctive forked tail. Ali (2010), Kulkarni *et al.* (2012) and Laxmi Narayana *et al.* (2013) detailed as the Black Drongo plays a significant role in insect pest control in the agricultural crops, insect prey mostly consist of dragonflies, grass hoppers, bees, bugs, moths and beetles. Therefore important predators like insectivorous birds need to be encouraged in the agro-ecosystem by use of appropriate management practices and also to assess the health of the ecosystem and management needs for the conservation of species and ecosystems (Lawton, 1996 and Loyn, 2002).

Mac Nally (1994) assured that studies on forging ecology of birds have been used to explain the community structure, resources use competition or co-existence in a particular habitat. Bibby *et al.* (1998) and Mariappan *et al.* (2013) agreed those studies are similar to population dynamics and their habitat studies. These data help to compare communities within and between habitats, that to we know the utilization

pattern, perch, foraging variable and food habits of the species. Same authors have been various works carried out on foraging ecology (Recher and Davis (1998); Gokula and Vijayan (2000); Asokan and Ali (2010) and Laxmi Narayana *et al.* (2011a and b). Detailed study on the foraging behavior of birds in and around agro-ecosystem of India is limited most of the priority given to threatened species (Dhindsa and Saini (1994); Parasharya *et al.* (1994); Asokan *et al.* (2009 and 2010); Laxmi Narayana *et al.* (2011). Hence, present investigation was designed to study foraging behavior with special reference to selection of perch types, perching height, foraging height, foraging substrates and foraging methods of the Black Drongo in the Nalgonda District, Andhra Pradesh, India.

MATERIALS AND METHODS

Study area

The present study was carried out in and around the agricultural ecosystem of Sherpally, Nalgonda District, Andhra Pradesh from December 2010 to March 2013. Various crops have been cultivated in these districts such as cotton, rice, maize, ragi *Eleusine coracana*, commonly Finger millet grams and variety of vegetables. Nalgonda is located at 15°03'N 78°16'E/15.05°N 78.27°E/15.05; 78.27 with an average

Table 1: Percent utilization and SD ± SE of various perch types used by Black Drongo in study area for the different years

Years	Electric power line (N)	%	Trees (N)	%	Shrub (N)	%	Ground (N)	%
2010-2011	212	30.3	54	35.1	81	32.3	2	20
2011-2012	433	61.9	79	51.3	134	53.4	8	80
2012-2013	54	7.7	21	13.6	36	14.3	0	0
Total	699	100	154	100	251	100	10	100
SD ± SE	27.2 ± 15.7	-	18.9 ± 10.9	-	19.6 ± 11.3	-	41.6 ± 24.0	-

Note: N = Number of observations

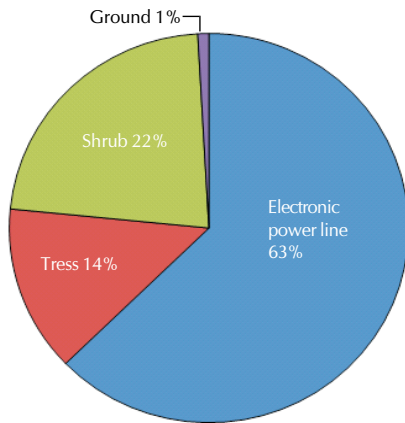


Figure 1: Percent utilization of various perch types (N = 1114) used by Black Drongo in study area for the study periods from December 2010 to March 2013

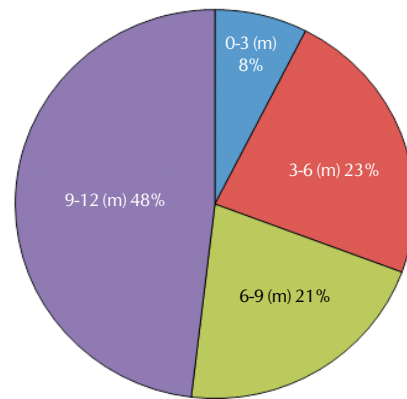


Figure 2: Percent utilization of various perching heights (N = 1104) used by Black Drongo in study area for the entire study periods from December 2010 to March 2013

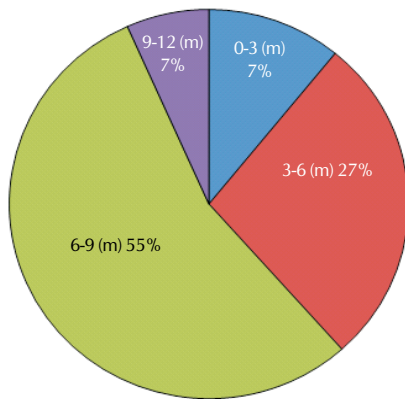


Figure 3: Percent utilization of foraging heights (N=466) used by Black Drongo in study area for the entire study periods from December 2010 to March 2013

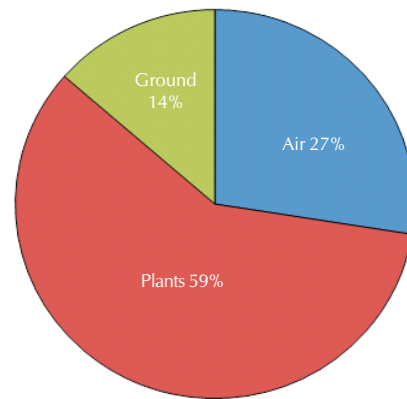


Figure 4: Percent utilization of various foraging substrates (N=331) by Black Drongo in study area for the entire study periods from December 2010 to March 2013

elevation of 421 meters (1381 ft). The climate is generally hot and dry with temperatures rising upto 43-45°C during May and dropping to 8-12°C in December. Increased irrigation facilities gave a boost to agricultural activity in the district. Out of a total of 1,423,423 ha land utilization in the district, more than 50% is cultivable land. The terrain of the district is suitable for irrigation development. The main crops grown in the district are Paddy, Jowar, Bajra, Ground Nut, Red gram, Green gram, Castor and Sugar cane in an area about 150,000 acres. Akkampally and Puttamgandi are that major perennial water sources used for irrigation. The predominant tree species found in the study area includes *Borassus flabellifer*, *Ficus*

benghalensis, *Azadirachta indica*, *Holoptilia integrifolia* and *Acacia nilotica*. Important shrub species viz. *Prosopis juliflora*, *Jatropha glandulifera* and *Vitex negundo*. Plantations of *Casuarina equisetifolia*, *Tectona grandis* and *Bamboosa arundinacea* are also found in the study area.

Methodology

The foraging behavior of Black Drongo was observed at the study area mostly within hours after sunrise. Individual birds were observed through binoculars and type of perch (electric power lines, trees, shrubs and ground), perching height (height at which the bird was perched while feeding - grouped into 0-3m, 3-6m, 6-9m and 9-12m), foraging height (0-3m, 3-6m, 6-

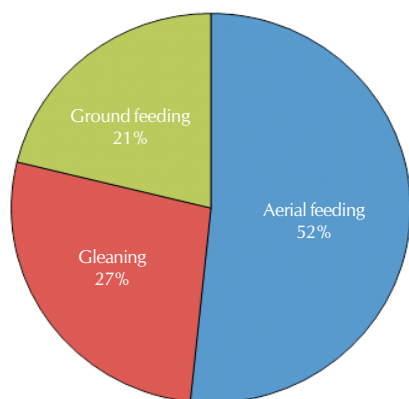


Figure 5: Percent utilization of various foraging methods (N = 151) by Black Drongo in study area for the entire study periods from December 2010 to March 2013

9m and 9-12m), foraging substrate (the material from which food is taken by the birds - classified into air, plants and ground) and foraging method (classified into *aerial feeding* - a bird flew into air to catch flying prey; *gleaning* - a stationary food item is picked from its substrate by a standing or hopping bird, and *ground feeding* - the bird picked prey from the ground) being used were noted (Bell and Ford 1990; Asokan 1995; Gokula 2001). The heights were visually estimated. From the data collected we determined and calculated percent use of different foraging variables used by the insectivorous bird species.

RESULTS AND DISCUSSION

Perch types

In total (N = 1114) foraging behavior observations of Black Drongo were recorded in the study area. Black Drongo used a multiplicity of perches for the purpose of hunting of the prey. Utilization of perches of Black Drongo in different years is vary based on foraging observation but mostly perched electric power lines detailed results given in the Table 1. In that reason

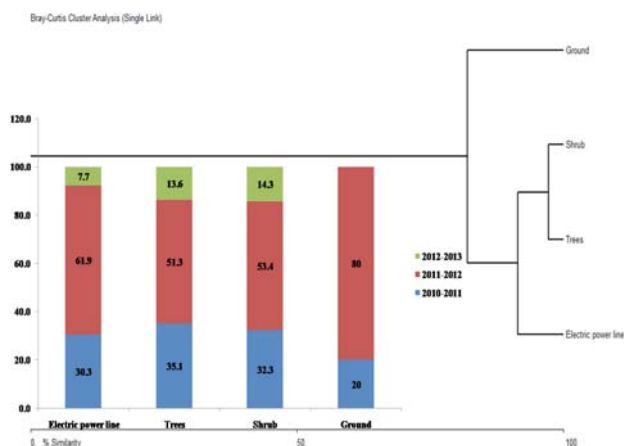


Figure 1: Percent utilization and cluster analysis of various perch types used by Black Drongo in study area for the different years

were we compiled the pooled data (December 2010 to March 2013). The results shows Black Drongo perched predominantly on electric power lines 63% (N = 699) followed by shrubs 22% (N = 251), trees 14% (N = 251) and ground 1% (N = 10) (Fig. 1, 2 and Plate 1).

Perching heights and foraging heights

Perching and foraging heights varied from 0 to 12 m. In common, a perching height of 9-12 m high with 48% (N = 1104) and foraging heights 6-9 m with 55% (N = 466) Fig. 4 and 5. Similarly, the studies conducted by Asokan (2010) Black Drongo fed at 0-3m and 3-6 m, other bird species Bee-eater and forage at heights of 0-3m similar percentage but our results shows not similar, this will be vary from region to region and the species to species and Sivakumaran and Thiyagesan (2003) found that Indian Roller perched at heights of 3-9m for locating prey.

Foraging substrates and foraging methods

In total of foraging substrates predominantly Black Drongo 59% (N = 331) used plants (herbs, shrubs and trees) as foraging substrate to find insect prey (Fig. 6), foraged mainly by aerial feeding 52% (N = 151) then other foraging methods (Fig. 7). Some facts about other species of birds from other region foraging by gleaning was relatively higher than other methods in Indian Roller and Common Myna, Black Drongo foraged exclusively by gleaning. Gleaning is also a common foraging technique reported for many avian species (Gokula and Vijayan 2000; Ashokan 2010) but the present results shows Black Drongo foraged by aerial feeding. It may be bird assemblages, availability of food resources and inter-specific competition same species in different populations respective habitats of study area (Joshi et al., 2012). Laxmi Narayana et al., (2013) showed variations in relation to different crops / habitats of bird assemblages from Nalgonda District of Andhra Pradesh. Hartley (1953), Feinsinger (1976) and Hutto (1981) stated that the distribution, abundance, and quality of food may influence the extent of foraging niche overlap.

The present results indicate that the insectivores bird species of Black Drongo (*Dicrurus macrocercus*), the study mainly carried out at agricultural surrounding areas. The species preferred to use electric power lines showed high. The electric

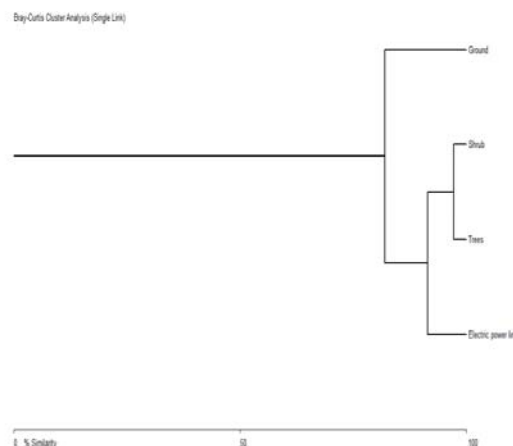


Figure 2: Association of Black Drongo with various perch types in the study area

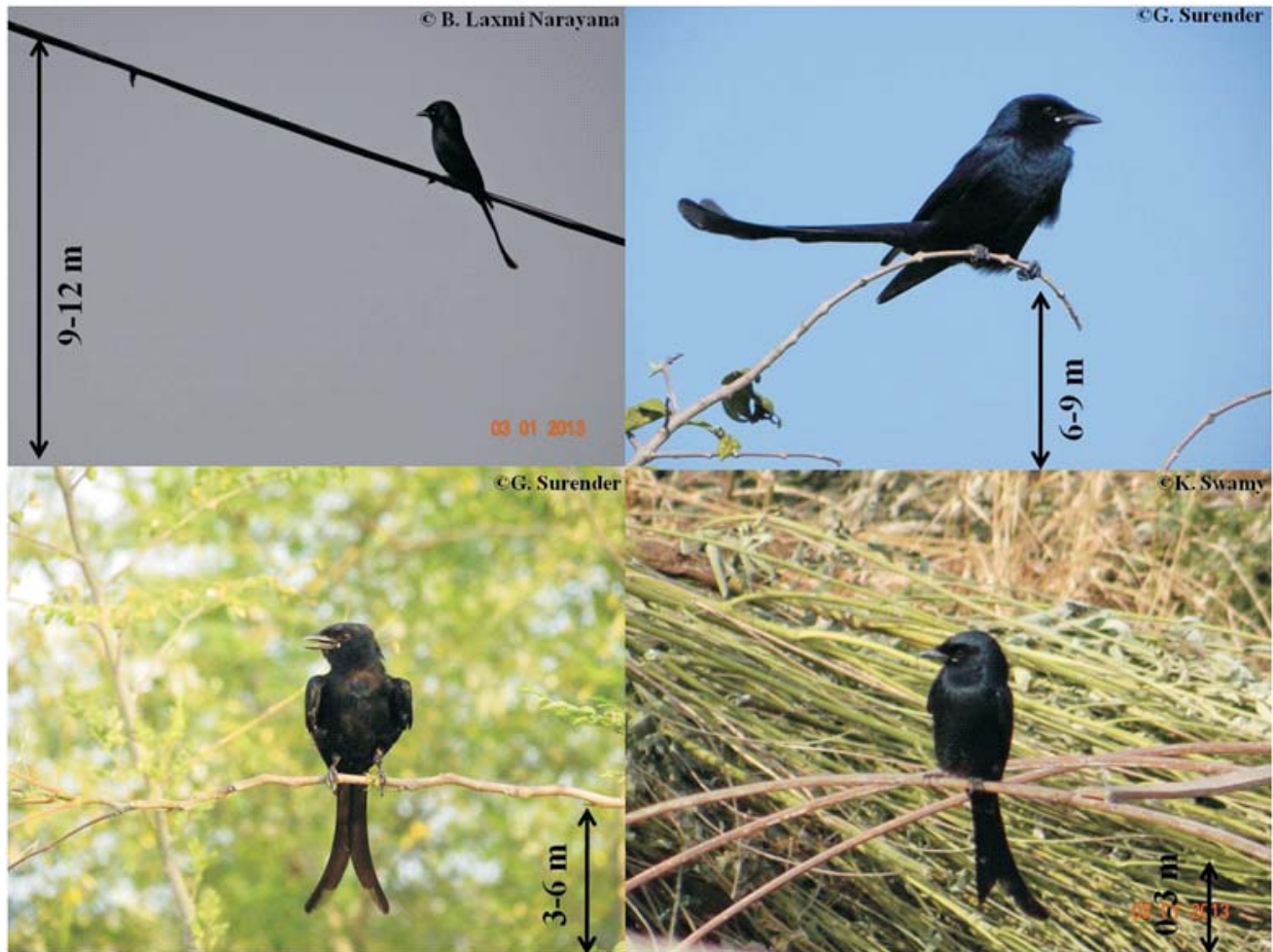


Plate 1: Utilization of various perch types used by Black Drongo in study area

power lines are a general feature in the study area mainly around the agricultural habitats. These structures provided suitable perches to bird for detecting the prey. The other dominant perch sites used in our study area were shrubs and trees mostly preferred and gamely trees and shrubs as perches. High-quality habitats for birds have attributes that influence their hunting success, such as perch height, perch abundance, vegetation density, and prey visibility. It is usually assumed that a perched bird scans a circular area under each perch (Yosef and Grubb, 1992), and that the explore area increases with perch height (Sonerud, 1992). The role of foraging substrates in prey selection in insectivorous birds, significance of perch characteristics (hunting perch) in birds has been highlighted by some authors (Bell (1982); Bell and Ford (1986); Hutto (1990); Asokan (1995); Gokula and Vijayan (2000). Our results indicate that the Black Drongo foraged absolutely by aerial foraging technique, which suggests that this species adopted a foraging technique fit to capturing moving insect prey on air. The use of foraging technique is determined partly by the morphology of birds (Gokula and Vijayan, 2000). The foraging technique birds also changed according to habitats and abundance of prey items (Racher and Davis 1998). In conclusion, many factors include such as time of day, season, ambient temperature, availability of prey, breeding season,

and presence of predators, influence the foraging behavior of birds. Kelly (1998) stated that weather, especially temperature, affects the foraging behavior of insectivorous birds. Several studies have found temperature-related changes in the foraging behavior of birds. Gokula and Vijayan (2007) and Asokan (2010) stated that food availability, habitat structure, and inter specific competition are also responsible for variation in the foraging behaviour. The Black Drongo interlinked with perch types, height and foraging height at forage substrate in relation of the habitat and availability of food resources and it is correlated in the present study. The present study also clear indicated that Black Drongo are very selective in performing foraging activity in different habitats with availability dietary items. The study also suggests the good impacts on implementation of IPM (Integrated pest management); it is beneficial to agriculturalists for installation of T-type shaped perches in different cops protecting from harmful insects that the reason Black Drongo act as beneficial bird in the agricultural ecosystem.

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