FORAGING PATTERN OF SOME BIRDS IN WAIMAW TOWNSHIP AND ITS ENVIRONS, KACHIN STATE

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Abstract

A total of 52 species belonging to 17 families were selected for observation of foraging pattern during the May 2017 to April 2018. They are categorizied into 18 groups. The present study highlight the foraging pattern of there birds species based on the food eaten and habitat use. In present study, seven substrates (Above canopy (ABC), the upper understory (UUN), unshaded canopy (USC), emergent leaves (EME), lower understory (LUN), Shaded canopy (SHC) and ground (GRO)) were categorized in Waimaw environs. Among 15 groups preferably utilized upper understory (UUN) level for foraging and 13 groups, the unshaded canopy (USC) level were mostly utilized for foraging opportunities on there environ because vegetation offered suitable food in this area.

Keywords: Foraging type, habitat use, Waimaw environs.

Introduction

Kachin State is Myanmar's northernmost province. The highest mountain of Myanmar, Hkakaborazi lies in this state. There are also other mountains in this area. These mountain are descendents of the Himalaya mountain ranges. Tropical deciduous forests and evergreen forests grow in the Kachin State, lies on the north of Tropic of Cancer, therefore the climate is warm, temperate and wet. Capital of Kachin State is Myitkyina. Waimaw Township is about 3.22 km far from Myitkyina. It is located near the bank of Ayeyarwaddy River. This area possesses diversity of habitat. Birds are used various kind of habitats. Depending upon the habitats different kinds of birds are evolved.

Foraging is searching for wild food resources. It affects an animal's fitness because it plays an important role in an animal's ability to survive and reproduce. Foraging theory is a branch of behavioral ecology that studied the foraging behavior of animals in response to the environment where the animal lives (Danchin, *et al.*, 2008).

Waimaw Township is selected as a study area. It lies 908.9m above sea level. It lies between latitude 25°22' N and 25°44′ N and 25°44′N and between longitude 97°12′ E and 97°24' E. It has an area of 1883.17 km^2. It is 35. 4 Km long from East to West, and 94.95 km from Sout to North. The area included consisting paddy fields, plantations, cultivated land, grass land and abundant leafy vegetation in some part of the township forms good habitats for various kinds of birds. The aim and objectives of this research are to investigate the foraging pattern of some birds species in Waimaw Township

Materials and Methods

The field work was conducted starting from May 2017 to April 2018 in different area of Waimar Township in Northern Kachin State. The method used in this research is point count method. The birds were observed from 6:30 am to 9:30 am in the morning and from 3:00 pm to 6:00 pm in the evening. However, special emphasis was given to record the foraging pattern.

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When an individual or group was encountered a standardised observation was made that described the activity and precise position of the birds and instantly recorded on photographs. Foraging observations were classed according to O'Donnell and Dilks (1994).

Foraging activity

(a) glean searching for and taking food from the surface of a substrate when the bird is not on the wing;

(b) hawk searching for and taking food when both prey and bird are in flight;

(c) hover searching for and taking food when the prey is on the substrate and the bird is in flight;

(d) probe penetrating into the substrate while searching for prey, most commonly in soil, little or rotting wood;

(e) rip ripping the substrate and exposing another surface,

(f) scan use of a vantage point to look for prey where the bird stops, looks and flies to another perch if no prey are sighted (O'Donnell and Dilks, 1994).

Level within the study sites (Stratum)

A measure of the foraging level the terrestrials bird was using within sampling sites: ground (GRO), lower understorey (LUN), upper understorey (UUN), shaded (within) canopy (SHC), unshaded (on top of) conopy (USC), in emergent leaves (EME), and above canopy (ABC) in flight. (O' Donnell and Dilks, 1994).

Results

Foraging pattern of studied species

52 species belonging to 17 families were selected for observation of food and foraging pattern. They are categorized into 18 groups.

Table 1 Groups of bird with representative species in the study area

Group	(Family)		Representative Species	Common Name
I	Pigeon and Dove (Columbidae)	1	*Columba livia*	Rock Pigeon
		2	*Streptopelia orientalis*	Oriental Turtte-Dove
		3	*S. chinensis*	Spotted Dove
		4	*Chalcophaps indica*	Emerald Dove
II	Kingfisher (Alcedinidae)	1	*Halcyon smyrnensis*	White-throated Kingfisher
		2	*Alcedo atthis*	Common Kingfisher
		3	*Ceryle rudis*	Pied Kingfisher
III	Roller (Coraciidae)	1	*Coracias benghalensis*	Indian Roller
IV	Bee-eater (Meropidae)	1	*Merops orientalis*	Little Green Bee-eater
		2	*M. Philippinus*	Blue-Tailed Bee-eater
		3	*M. leschenaulti*	Chestnut-headed Bee-eater
V	Barbet (Megalaimidae)	1	*Megalaima lineata*	Lineated Barbet
		2	*M. asiatica*	Blue-throated Barbet

Group (Family)		Representative Species		Common Name
		3	*M. haemacephala*	Coppersmith Barbet
VI	Drongo	1	*Dicrurus macrocercus*	Black Drongo
	(Dicruridae)	2	*D. leucophaeus*	Ashy Drongo
		3	*D. aeneus*	Bronzed Drongo
VII	Treepie	1	*Pica pica*	Black-Billed Magpie
	(Corvidae)	2	*Dendrocitta vagabunda*	Rufous Treepie
		3	*D. formosae*	Grey Treepie
		4	*D. frontalis*	Collared Treepie
VIII	Shrike	1	*Lanius oristatus*	Brown shrike
	(Laniidae)	2	*L. schach*	Long-tailed shrike
		3	*L. tephronotus*	Grey-backed shrike
IX	Sparrow	1	*Passer domesticus*	House Sparrow
	(Passeridae)	2	*P. montanus*	Eurasian Tree Sparrow
X	Pipit & Wagtail	1	*Anthus roseatus*	Rosy Pipit
	(Motacillidae)	2	*A. rufulus*	Paddy Field Pipit
		3	*Motacilia alba*	White Wagtail
		4	*M. citreola*	Citrine Wagtail
XI	Myna & Starling	1	*Acridotheres fuscus*	Jungle Myna
	(Sturnidae)	2	*A. albocinctus*	Collared Myna
		3	*A. tristis*	Common Myna
		4	*A. burmannicus*	Vinous-Breasted Myna
		5	*Gracupica nigricollis*	Black-collared Starling
		6	*G. contra*	Asian Pied Starling
XII	Thrush	1	*Monticola rufiventris*	Chestnut-Bellied Rock Thrush
	(Muscicapidae)	2	*Myophonus caeruleus*	Blue Whistling Thrush
XIII	Chat & Forktail	1	*Saxicola Ferreus*	Grey Bush chat
	(Muscicapidae)	2	*S. maurus*	Eastern stonechat
		3	*S. caprata*	Pied Bushchat
		4	*Enicurus scouleri*	Little Forktail
XIV	Tit(Paridae)	1	*Parus monticolus*	Green-backed Tit
XV	Bulbul	1	*Pycnonotus jocosus*	Red-whiskered Bulbul
	(Pycnonotidae)	2	*P. cafer*	Red-Vented Bulbul
		3	*Hypsipetes leucocephalus*	Himalayan Black Bulbul
		4	*Pycnonotus finlaysoni*	Stripe-throated Bulbul
XVI	Swallow	1	*Hirundo rustica*	Barn Swallow
	(Hirundinidae)	2	*H. smithii*	Wire-Tailed Swallow
		3	*Cecropis striolata*	Striated swallow
XVII	Tailorbird	1	*Orthotomus sutorius*	Common Tailorbird
	(Cettiidae)			
XVIII	Prinia	1	*Prinia crinigera*	Striated Prinia
	(Cisticolidae)			

Pigeons and Dove (**Columbidae**)

Four species were recorded under this family, Rock Pigeon *Columba livia*, Oriental Turtle-Dove *Streptopelia orientalis*, Spotted Dove *Streptopelia chinensis* and Emerald Dove *Chalcophaps indica*. Pigeons fed almost entirely by gleaning in the unshaded canopy (20.8%), emergent leaves (20.1%), ground (18.2%), shaded canopy (15.6%), upper urderstorey (12.8%), and lower understorey (12.5%) (Table 2, Fig 1).

Kingfisher (**Alcedinidae**)

Under this family, three species were recorded White-throated kingfisher *Halcyon smyrnensis*, Common kingfisher *Alcedo atthis* and Pied kingfisher *Ceryle rudis*. Kingfisher fed almost entirely by hovering in the above canopy (39.3%) emergent leaves (25.7%), upper understorey (20.3%) and lower understorey (14.7%) (Table 2, Fig 1).

Roller (**Coraciidae**)

Only one species in this family recorded Indian Roller *Coracias benghalensis*. Roller fed almost entirely by hovering in the emergent leaves (48.9%), ground (33.3%) and upper understorey (17.8%) (Table 2, Fig 1).

Bee-eater (**Meropidae**)

The representative of this family, Little Green Bee-eater *Merops orientalis*, Blue-Tailed Bee-eater *Meropsphilippinus* and Chestnut-headed Bee-eater *Merops leschenaulti* were hawking in the above canopy (44.3%), emergent leaves (35.2%) and unshaded canopy (20.5%) (Table 2, Fig 1).

Barbet (**Megalaimidae**)

Under this family, three species were record Lineated Barbet *Megalaima lineata*, Blue-throated Barbet *M. asiatica* and Coppersmith Barbet *M. haemacephala*. Barbet fed almost entirely by ripping the unshaded canopy (56.2%), Shaded canopy (33.3%), upper understorey (10.5%) (Table 2, Fig 1).

Drongo (**Dicruridae**)

Three species were recorded under this family, Balck Drongo *Dicrurus macrocercus*, Ashy Drongo *D. leucophaeus* and Bronzed Drongo *D. aeneus*. Drongo fed almost entirely by gleaning in the emergent leaves (34.9%), unshaded canopy (25.6%), above canopy (20.1%), ground (10.1%) and upper understorey (9.3%) (Table 2, Fig 1).

Treepie (**Corvidae**)

Under this family, five species were recorded Black-billed Magpie *Pica pica*, Rufous Treepie *Dendrocitta vagabunda*, Grey Treepie *D. formosae* and collared Treepie *D. frontalis*. Treepie fed almost entirely by scanning in the above canopy (42.7%), emergent leaves (31.8%), shaded canopy (13.9%) and lower understorey (11.6%) (Table 2, Fig 1).

Shrike (**Laniida**e)

Shrike were represented in the study area by three species, Brown Shrike *Lanius cristatus*, long-tailed shrike *L. schach* and Grey-backed shrike *L. tephronotus*. These shrike used by scanning in the shaded canopy (35.1%), lower understorey (33.3%) and upper understorey (31.6%) (Table 2, Fig 1).

Sparrow (**Passeridae**)

Two sparrow species, House sparrow *Passer domesticus* and Eurasian Tree sparrow *P. montanus* were recorded in the study area. Both sparrows fed mainly by gleaning. Sparrows were observed throughout emergent leaves levels to the ground. (Table 2, Fig 1).

Pipit and Wagtial (**Motacillidae**)

This group comprised four species, *Pipit (Anthus roseatus and Anthus rufulus*) and *Wagtail* (*Motacillia alb*a and *Motacilia citreola*) were recorded. Both bird species fed mainly by probing but there two species search for food in different ways: Pipit fed in the paddy field and Wagtail in aquatic shallow. A wide range of ground (46.3%), upper understorey (33.4%) and lower understorey (20.3%) both species were used (Table 2, Fig 1).

Myna and Starling (**Sturnidae**)

Six species of introduced Myna & Starling were found in study area: Jungle Myna *Acridotheres fuscus*, Collared Myna *A. albocinctus*, Common Myna *A. tristis*, vinous-Breasted Myna *A. burmannicus*, Black-collare Starling *Gracupica nigricollis* and Asian Pied Starling *G. contra*. Feeding observations of the Myna and Starling were probing. When they fed in the ground and all foraging level in the study area (Table 2, Fig 1).

Thrush (**Muscicapidae**)

Thrush were represented in the study area by two species recorded Chestnut-Bellied Rock-Thrush *Monticola rufiventris* and Blue Whistling-Thrush *Myophonus caeruleus*. Thrush fed mainly by gleaning in the shaded canopy (26.9%), unshaded canopy (22.1%), upper understorey (20.35%), ground (16.35%) and above canopy (14.3%) (Table 2, Fig 1).

Chat and Forktail (**Muscicapidae**)

This group comprised four species, Grey Bushchat *Saxicola ferreus*, Eastern Stonechat *S. maurus*, Pied Bushchat *S. caprata* and Little Forktail *Enicurus scouleri*. Both species fed mainly by gleaning in the lower understorey (39.6%), upper understorey (33.6%), shaded canopy (20.7%) and unshaded canopy (6.1%) (Table 2, Fig 1).

Tit (**Paridae**)

One species were found in study area: Green-backed Tit *Parus monticolus*. Tit fed almost entirely by scanning in the shaded canopy (32.1%), lower understorey (25.3%), unshaded canopy (22.7%) and upper understorey (19.9%) (Table 2, Fig 1).

Bulbul (**Pycnonotidae**)

This group comprised four species, that Red-whiskered Bulbul *Pycnonotus jocosus*, Red-vented Bulbul *P. cafer*, Himalayan Black Bulbul *Hypsipetes leucocephalus* and Stripe-Throated Bulbul *Pycnonotus finlaysoni*. Bulbul foraging was by gleaning in the lower understorey (28.7%), unshaded canopy (24.5%), emergent leaves (20.2%), shaded canopy (16.4%), upper understorey (10.2%) (Table 2, Fig 1).

Swallow (**Hirundinidae**)

Three species were recorded under this family. Barn Swallow *Hirundo rustica*, Wire-Tailed swallow *H. smithii* and Striated swallow *Cecropis striolata*. The native insectivorous species mainly fed by hovering in above canopy (48.3%), emergent leaves (32.9%) and unshaded canopy (18.8%) (Table 2, Fig 1).

Tailorbird (**Cettiidae**)

Common Tailorbird *Orthotomus sutorius* was recorded under this family. Tailorbird fed almost entirely by hovering in the unshaded canopy (28.4%), upper understorey (21.4%), shaded

canopy (21.2%), emergent leaves (18.3%) and lower understorey (10.7%) (Table 2, Fig 1).

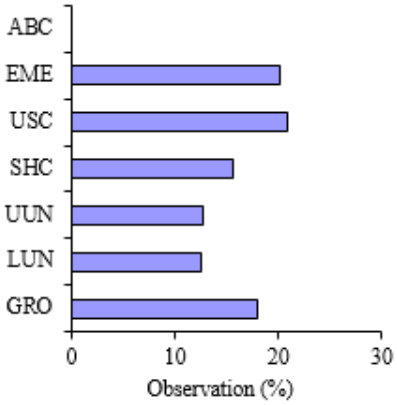
Prinia (**Cisticolidae**)

Striated Prinia *Prinia crinigera* was recorded under this family. Prinia fed mainly by hovering at upper understorey (32.1%), lower understorey (30.4%), emergent leaves (21.1%) and unshaded canopy (16.4%) (Table 2, Fig 1).

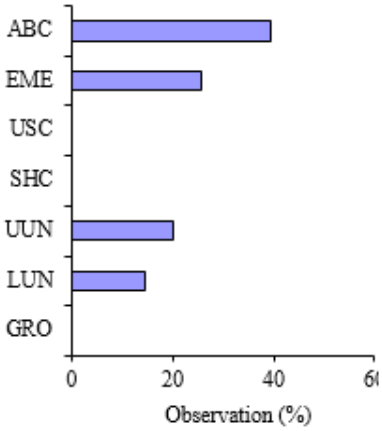
Table 2 Percentage of foraging layers utilized by terrestrial birds

Sr. No	Group Name	No. of observation	ABC	EME	USC	SHC	UUN	LUN	GRO
1.	Pigeon and Dove	385	-	20.1	20.8	15.6	12.8	12.5	18.2
2.	Kingfisher	20	39.3	25.7	-	-	20.3	14.7	-
3.	Roller	14	-	48.9	-	-	17.8	-	33.3
4.	Bee-eater	31	44.3	35.2	20.5	-	-	-	-
5.	Barbet	10	-	-	56.2	33.3	10.5	-	-
6.	Drongo	22	20.1	34.9	25.6	-	9.3	-	10.1
7.	Treepie	9	42.7	31.8	-	13.9	-	11.6	-
8.	Shrike	88	-	-	-	35.1	31.6	33.3	-
9.	Sparrow	278	-	21.5	18.2	17.2	15.2	14.7	13.2
10.	Pipit and Wagtail	17	-	-	-	-	33.4	20.3	46.3
11.	Myna and Starling	243	15.4	10.6	13.5	14.3	11.7	9.2	25.3
12.	Thrush	13	14.3	-	22.1	26.9	20.34	-	16.36
13.	chat and Forktail	160	-	-	6.1	20.7	33.6	39.6	-
14.	tit	12	-	-	22.7	32.1	19.9	25.3	-
15.	bulbul	63	-	20.2	24.5	16.4	10.2	28.7	-
16.	Swallow	98	48.3	32.9	18.8	-	-	-	-
17.	Tailorbird	10	-	18.3	28.4	21.2	21.4	10.7	-
18.	Prinia	12	-	21.1	16.4	-	32.1	30.4	-
	Total individual	**1485**							
	Total group		**7**	**12**	**13**	**11**	**15**	**12**	**7**

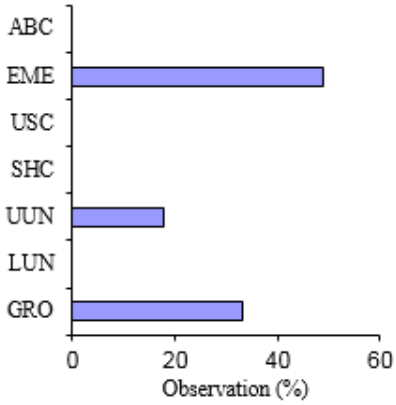
Foraging layer : ABC = above canopy, EME = emergent leaves,
USC = unshaded canopy, SHC = Shaded canopy,
UUN = upper understorey, LUN = lower understorey,
GRO = ground, N = number of birds
(-) = zero observations



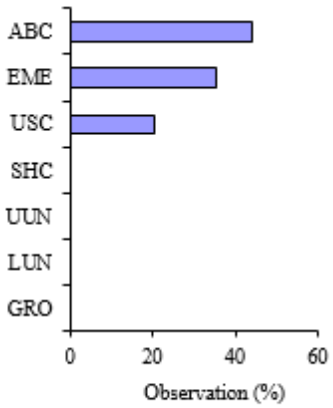
(A) Pigeon and Dove



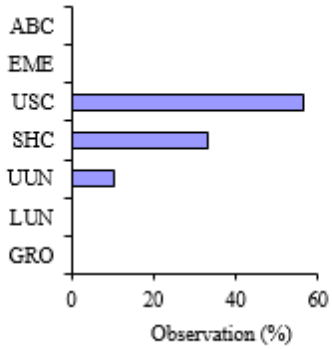
(B) Kingfisher



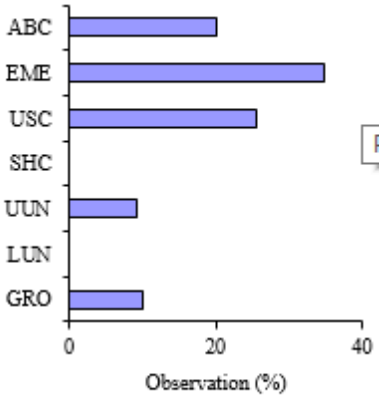
(C) Roller



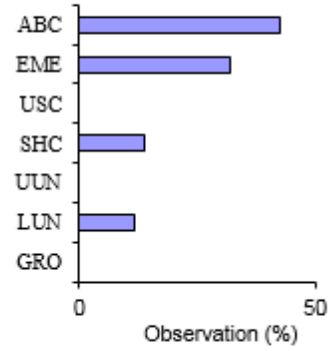
(D) Bee-eater



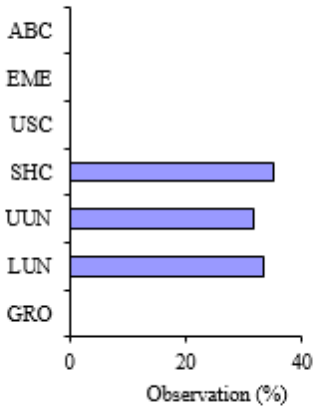
(E) Barbet



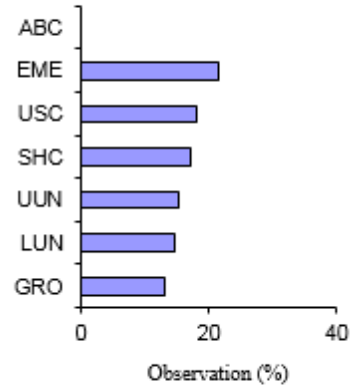
(F) Drongo



(G) Treepie



(H) Shrike



(I) Sparrow

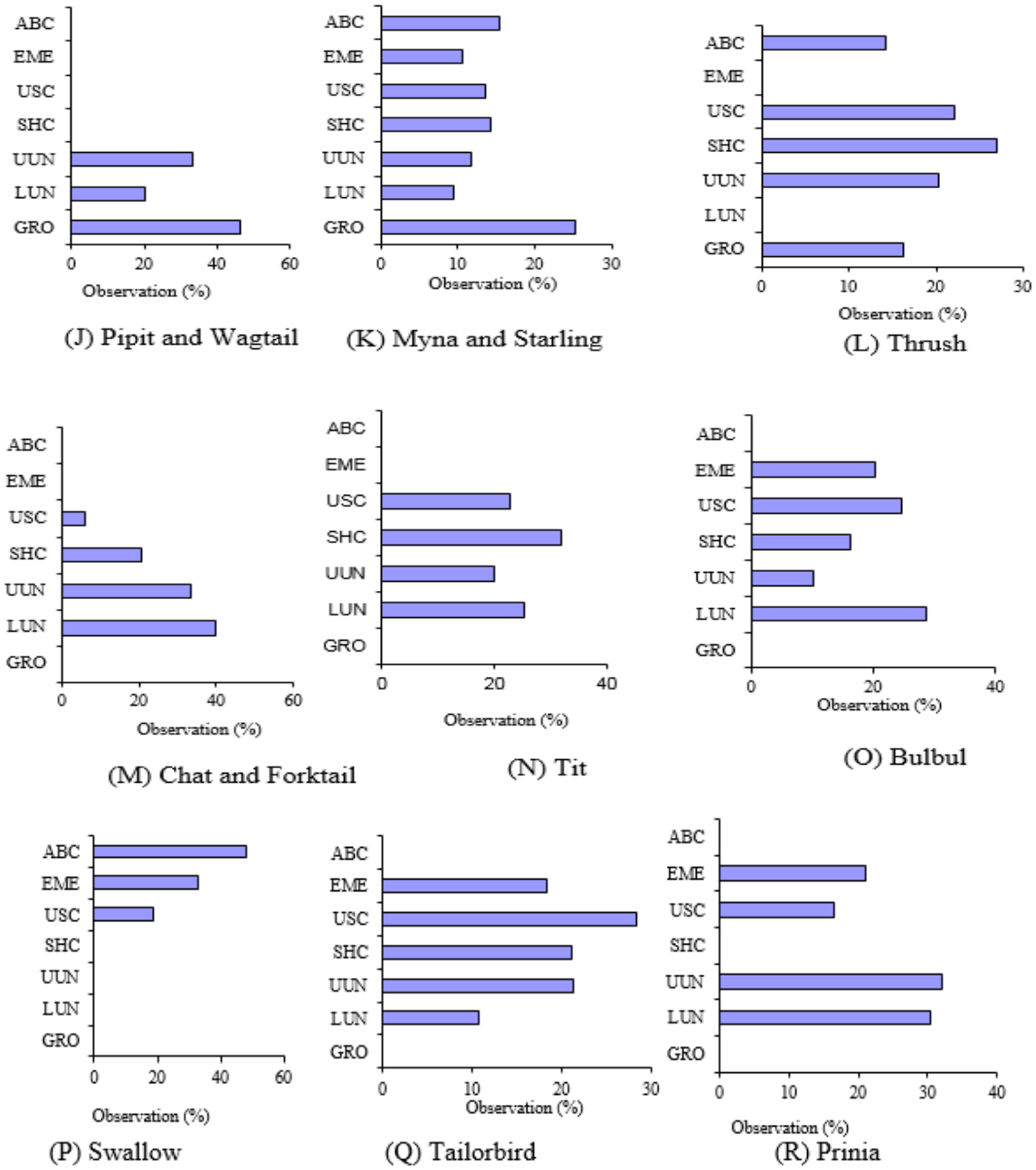


Figure 1 Percentage of foraging layers utilized by terrestrial birds Foraging layer : ABC = above canopy, EME = emergent leaves, USC = unshaded canopy, SHC = Shaded canopy, UUN = upper understorey, LUN = lower understorey, GRO = ground, N = number of birds

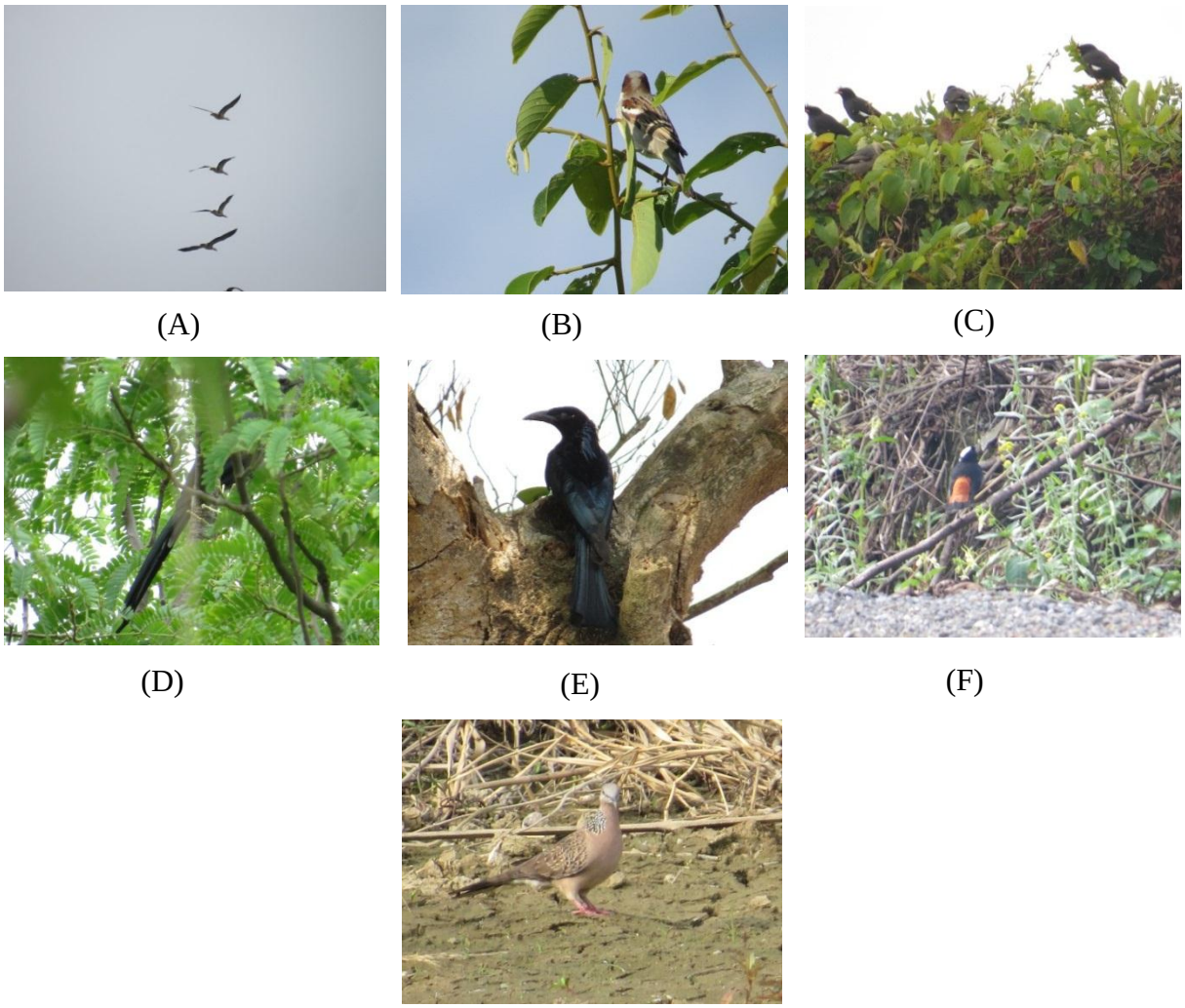


Plate 1 Foraging layers by terrestrial birds
A. Above canopy
B. Emergent leaves
C. Unshaded (on top of) conopy
D. Shaded (within) canopy
E. Upper understorey
F. Lower understorey
G. Ground

Discussion and Conclusion

In present study, among the observed seven substrates were taken into consideration and included upper understorey (UUN), unshaded canopy (USC), emergent leaves (EME), lower understorey (LUN), shaded canopy (SHC) and ground (GRO) were mostly utilised for foraging opportunities on these envrions because vegetation offered suitable food in this area. A larger number of terrestrial birds species were observed to assemblage in these substrates. *Saxicola ferreus* (Grey Bushchat) and *Enicurus scouleri* (Little Forktail) frequently used upper understorey and lower understorey. Barbet and Tailor bird mostly used unshaded canopy. Noske (1995) discovered that the Arctic Warbler and the Ashy Tailorbird were very similar in foraging behaviour with a mean overlap of 70% in substrates used for foraging.

In the present study, a total of 52 species forage on the ground and out which some species Pipit and Wagtail, Myna and Starling, Roller, Pigeon and Dove and Thrush used this substrate. Therefore, both insectivores and granivores used this substrate. Sultana (2002) reported that the height and height related characteristics separated the ground foragers from these species and formed three distinct foraging environments (ground, plants and air). The complexity of foliage layer provided supporting substrates.

Sultana and Hussain (2010) pointed out that, a large number of bird species fall under the plant guild because plant offers a greater variety of microhabitats for the birds to find suitable food for them.

In present study birds mostly use seven foraging activity to obtain food and closely related species used the same basic searching method. Pigeon and Dove forages by gleaning on the substrate. Myna and Starling were probing. Searching patterns are largely a function of the morphological and perceptual traits of each species, which allow the birds to move through the foliage, locate, detect and capture the prey in specific ways. The feeding methods are move specialized in each species not with standing the habitat structure. Resource partitioning reduces the effect of competition by decreasing the amount of overlap between the competing species (Wiens, 1989).

The same groups belonging to different species such as Myna and Starling (Sturnidae) have shown mostly similarity in foraging. It may be suggested that the morphological character was more or less similar. Hutto (1981) suggested that a group of species, which were similar in their morphological adaptation, formed assemblage. For example, all the pheasant species were ground foragers but other bird species with different morphologies also utilized the same general searching mode and procured similar types of prey e.g. thrushes.

Robinson and Holmes (1984), revealed that closely related species that share similar morphological traits are likely to show similar foraging maneuvers.

Therefore, food and feed habit of birds were more likely to reflect changes in foraging maneuvers.

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