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J. Alfred Daniel
Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Correspondence
J. Alfred Daniel
Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Commonly found avifauna of Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

J. Alfred Daniel

Abstract
This work was taken with the prime objective to make an inventory of the avifauna of Tamil Nadu Agricultural University campus. A total of 54 taxa of avifauna belonging to 34 families has been recorded in the survey carried out from August 2014 to August 2015. For birding, the campus was mapped into three different habitats *viz.,* Wet land - Paddy Breeding Station (PBS), Botanical Garden and Orchard. Comparison of species similarities between the habitats, revealed 1.75% similarity between PBS and Botanical Garden, 1.81% similarity between PBS and Orchard and 42.85% between Botanical Garden and Orchard. Among the three sites PBS ranks first with the record of more number of species (32) followed by Botanical garden (26) which is closely followed by Orchard (24). Among the feeding guilds, insectivores dominate in species strength (33.33%) followed by carnivores (25.92%), omnivores (16.67%), grainivore (12.97%), piscivores (9.25%) and nectarivores (1.85%). The results of relative diversity (RD) index showed that Ardeidae (RD value = 7.40) was the dominant family in the area.

Keywords: Avian fauna, diversity, Tamil Nadu Agricultural University Campus, Coimbatore

1. Introduction
Birds are considered good indicators of environmental quality and are frequently being used to monitor environmental and ecosystem health [7] and act as bio indicators of inhabited areas [5]. When birds are dependent on the habitat functioning in specific ways, the population trends of birds can tell us about how well the ecosystem is functioning. Indian subcontinent, a part of the vast Oriental Bio-geographic regions, is very rich in biodiversity. There are approximately 9,990 bird species recorded in our planet out of which, the Indian subcontinent is home to 1,313 bird species (over 13%) [12]. Population of bird is a very sensitive indicator of degree of pollution in both terrestrial and aquatic ecosystem [11, 13,]. Avifauna is also important for the ecosystem as they play various roles as scavenger, pollinators, seeds dispersal agent and predators of insect pest [17]. On the other hand, like other living beings, birds too directly or indirectly depend upon plants for subsistence. Thus, in agriculture, the role of birds is complex but interesting and varied. Birds also affect agricultural produce through depredation of crops in their attempt to obtain food. In India 50 genera representing 132 species and 234 subspecies are reported to depredate agricultural crops. Among this, many are notorious pests causing extensive damage to field crops particularly the ripening grains, orchard fruits, vegetables, and even young seedlings. Intensive use of chemical fertilizers and pesticide as a part of the agriculture activities have played havoc on the traditional farming system and thus affecting birds, other wildlife as well as human beings [18]. Organochlorine and organophosphate pesticides are widely used in crop cultivation. Several studies reveal that that these chemicals are present well above the permissible limits. Unfortunately global diversity of birds is decreasing due to anthropogenic activities and climate changes [8, 19]. In the assessment of IUCN Red List several species of birds are considered to be threatened globally out of which 88 are from India [4]. Hence this work was taken with the prime objective to make an inventory of the avifauna of Tamil Nadu Agricultural University so as to generate a baseline data for future studies.

2. Materials and Methods
To study the avifauna of Tamil Nadu Agricultural University campus fortnight observations were conducted from August 2014 to August 2015. The university is situated at and elevation of 426.72m and between 11^0 latitude and 77^0 longitude. For the purpose of birding, the campus

was mapped into three types of habitats *i.e.,* Wet land – Paddy Breeding Station (PBS), Botanical Garden and Orchard. PBS is meant for paddy cultivation and so irrigation ponds, standing water paddy, ditches are its specialties. The total area is 12.96 ha. Botanical garden is spread over 270 ha and is more or less a wild habitat with trees and shrubs and with minimum anthropogenic disturbances. Orchard is meant for the cultivation of fruiting plants, vegetables and it is about 57 ha. Fixed radius (20 m) point count method (for the orchard), line transect method (for the wetland habitat, and the botanical garden) and direct observation methods were used [9]. Monitoring of transects were done either in early morning from 6.00 to 7.00 or late evening from 17.00 to 18.00 hours as the birds become active during this period of the day. The surveys were only performed during suitable weather (*i.e.,* in the absence of rain or strong wind). Occasional sightings of birds during non-birding trips were also included. Photography was done by making use of Canon Power Shot SX 40 camera. Olympus 8 x 40 DPS binoculars were used to observe the birds. Birds were identified with the help of different field guides [2, 12, 20]. Feeding guilds were classified as per direct observations and available literatures [2]. The feeding guilds were determined according to the primary and predominant food type. This approach is consistent with the classifications used by [1, 6, 10, 21]. Birds were classified as Common (60-80% sighting), uncommon (40-60% sighting), occasional (20-40% sighting) and Rare (< 20% sighting). The following formula was used for determining percentage of occurrence of Families [22]. Percentage of occurrence is also stated as Relative diversity. Percentage occurrence = (No. of species of each family/ Total no. of different species seen) x 100. Beta diversity between the three sites were also assessed so as to compare the species similarity between the sites. The most widely used index for assessment of Beta diversity is Jaccard Index (JI) [16], which is calculated using the equation: JI (for two sites) $=j / (a+b-j)$, where j=the number of species common to both sites A and B, a=the number of species in site A and b=the number of species in site B. It is assumed that the data to be normally distributed and adopted parametric statistics for comparing the sites.

3. Results and Discussion

A total of 54 species belonging to 34 families have been identified from Tamil Nadu Agricultural University Campus. A comparative chart of the total bird species belonging to different families along with their feeding preference and abundance are provided in Table 1. The photographs of all the birds are depicted in Plate 1.

Table 1: Different species of birds from the study site with their abundance and places of sighting

No	Common Name	Scientific Name	Places of sighting	Abundance
Family: Phasianidae, mainly eat seeds, fruits, invertebrates, RD = 3.70%				
1	Indian peafowl	*Pavo cristatus*	PBS, BG, OR	C
2	Grey francolin	*Francolinus pondicerianus*	OR	O
Family: Anatidae, chiefly vegetarian also feeds on aquatic invertebrates, RD = 3.70%				
3	Indian spot billed duck	*Anas poecilorhyncha*	PBS	U
4	Cotton pygmy-goose	*Nettapus coromandelianus*	PBS	R
Family: Threskiornithidae, feeds on fish frogs and other aquatic invertebrates, RD = 1.85%				
5	Black headed Ibis	*Threskiornis melanocephalus*	PBS	U
Family: Ardeidae, feeds on wide variety of aquatic prey, RD = 7.40%				
6	Indian pond heron	*Ardeola grayii*	PBS, BG	C
7	Purple heron	*Ardea purpurea*	PBS	O
8	Grey heron	*Ardea cinerea*	PBS	R
9	Cattle egret	*Bubulcus ibis*	PBS	C
Family: Pelecanidae, the scoops up fish from the water, RD = 1.85%				
10	Spot billed pelican	*Pelecanus philippensis*	PBS	R
Family: Anhingidae, adopted for hunting fish underwater, RD = 1.85%				
11	Darter	*Anhinga melanogaster*	PBS	R
Family: Phalacrocoracidae, they eat mainly fish, RD = 1.85%				
12	Little cormorant	*Phalacrocorax niger ?*	PBS	U
Family: Accipitridae, feed on mammals, reptiles, fish, insects, RD = 5.55%				
13	Brahminy kite	*Haliastur indus*	BG	R
14	Shikra	*Accipter badius*	BG, OR	U
15	Black kite	*Milvus migrans*	BG	U
Family: Rallidae, they eat insects, fish and vegetable matter, RD = 5.55%				
16	White breasted waterhen	*Amaurornis phoenicurus*	PBS	U
17	Purple swamphen	*Porphyrio porphyrio*	PBS	C
18	Eurasian coot	*Fulica atra*	PBS	R
Family: Charadriidae, they pick up invertebrate prey, RD = 3.70%				
19	Red wattled lapwing	*Vanellus indicus*	PBS, BG, OR	C
20	Common ringed plover	*Charadrius hiaticula*	PBS	U
Family: Columbidae, seeds, fruits, and leaves form their main diet, RD = 1.85%				
21	Common pigeon	*Columba livia*	BG, OR	C
Family: Psittaculidae, Their diet is almost entirely vegetarian, RD = 1.85%				
22	Rose ringed parakeet	*Psittacula krameri*	BG, OR	C
Family: Cuculidae, cuckoos eat caterpillars and invertebrates, RD = 5.55%				
23	Common hawk cuckoo	*Hierococcyx varius*	BG, OR	R
24	Asian koel	*Eudynamys scolopaceus*	BG, OR	U
25	Southern coucal	*Centropus parroti?*	BG, OR	U
Family: Strigidae, their diet consists of small invertebrates, RD = 1.85%				
26	Spotted owlet	*Athene brama*	BG, OR	U

Family: Upupidae, they are insectivorus, RD = 1.85%				
27	Common hoopoe	*Upupa epops*	BG, OR	O
Family: Coraciidae, they mainly eat insects, RD = 1.85%				
28	Indian roller	*Coracias benghalensis*	PBS, BG, OR	C
Family: Alcedinidae, they mainly eat frogs, lizards and rodents, RD = 3.70%				
29	White throated king fisher	*Halcyon smyrnensis*	PBS, BG, OR	C
30	Pied kingfisher	*Ceryle rudis*	PBS	R
Family: Meropidae, they catch flying insects, RD = 1.85%				
31	Green bee eater	*Merops orientalis*	PBS	U
Family: Ramphastidae, they are chiefly frugivorous, RD = 3.70%				
32	Brown headed barbet	*Megalaima zeylanica*	BG, OR	O
33	Copper smith barbet	*Megalaima haemacephala*	BG, OR	R
Family: Picidae, feed on ants, termites, grubs of conceled beetles, RD = 1.85%				
34	Flame back	*Dinopium benghalense?*	BG, OR	U
Family: Dicruridae, they are mainly insectivours, RD = 3.70%				
35	Greater racket tailed drongo	*Dicrurus paradiseus*	BG	O
36	Black drongo	*Dicrurus macrocercus*	PBS, BG, OR	C
Family: Monarchidae, they feed mainly on insects, RD = 1.85%				
37	Indian paradise flycatcher	*Terpsiphone paradise*	BG	O
Family: Hirundinidae, catch their food while flying in the open, RD = 1.85%				
38	Barn swallow	*Hirundo rustica*	OR	R
Family: Corvidae, they are omnivorous, RD = 3.70%				
39	House crow	*Corvus splendens*	PBS, BG, OR	C
40	Rufous treepie	*Dendrocitta vagabunda*	BG, OR	U
Family: Sturnidae, feed on fruits and insects, RD = 3.70%				
41	Common myna	*Acridotheres tristis*	PBS, BG, OR	C
42	Brahminy starling	*Sturnia pagodarum*	PBS	R
Family: Estrildidae, they feed chiefly on small seeds, RD = 5.55%				
43	Scaly breasted munia	*Lonchura punctulata*	PBS	C
44	White rumped munia	*Lonchura striata*	PBS	O
45	Black headed munia	*Lonchura Malacca*	PBS	O
Family: Motacillidae, they feed by picking insects from ground, RD = 3.70%				
46	Grey wagtail	*Motacilla cinerea*	PBS, BG, OR	O
47	White browed wagtail	*Motacilla maderaspatensis*	PBS, OR	O
Family: Ciconiidae, they capture fish, frog, snakes, molluscs etc., RD = 1.85%				
48	Asian openbill	*Anastomus oscitans*	PBS	C
Family: Podicipedidae, they catch fish and aquatic invertebrates, RD = 1.85%				
49	Little Grebe	*Tachybaptus ruficollis*	PBS	R
Family: Timaliidae, chiefly insectivores augmented with fruits, RD = 1.85%				
50	Yellow-billed babbler	*Turdoides affinis*	BG, OR	C
Family: Ploceidae, they feed on seeds, and invertebrates, RD = 1.85%				
51	Baya weaver	*Ploceus philippinus*	PBS	U
Family: Muscicapidae, their diet is insects and they consume fruits too, RD = 1.85%				
52	Pied Bushchat	*Saxicola caprata*	OR	U
Family: Nectariniidae, feed on nectar, RD = 1.85%				
53	Purple sunbird	*Cinnyris asiaticus*	BG, OR	C
Family: Scolopacidae, their diet consist of aquatic invertebrates, RD = 1.85%				
54	Wood sandpiper	*Tringa glareola*	PBS	U

PBS- Paddy Breeding Station, **BG-** Botanical Garden, **OR-** Orchard; **RD-** Relative Diversity; **C**-common, **U**-uncommon, **O**-ocassional, **R**-rare

The present study revealed that the species richness was maximum (32) in Paddy Breeding Station followed by Botanical Garden (26) and it was (24) in Orchard. 4 species were recorded from Orchard alone, 3 species were recorded from Botanical Garden alone and 22 species were recorded from Paddy Breeding Station alone. 8 species of birds were recorded from all the three habitats. Paddy Breeding Station and Botanical Garden shared only one species likewise, Paddy Breeding station and Orchard also shared only one species in common. But 15 species were shared by Botanical Garden and Orchard. Among the 34 families 20 families are represented by one species, 9 families are represented by two species, 4 families were represented by three species and 4 species were found in only one family *i.e.,* Ardeidae and so it was found to be the most dominant family in the campus with a RD Index value of = 7.40 followed by Accipitridae, Rallidae, Cuculidae, Estrildidae (RD Index value = 5.55), The RD Index value of Anatidae, Corvidae, Phasianidae, Charadriidae, Alcedenidae, Sturnidae, Ramphastidae, Dicruridae, Motucillidae is 3.70 and all the remaing families has the RD Index value of 1.85. Black headed ibis (*Threskiornis melanocephalus*), a sighting of special interest belongs to Near Threatened (NT) category, moreover it is also categorized as Biome Restricted Species (BRS) by Bird Life International. The bird composition of a site depends on the vegetation structure. Existences of trees, bushes, creepers are very important to them [15]. More complex vegetation structure is associated with greater diversity. The agricultural fields surrounding orchard, plantations surrounding the botanical garden, probably provided shelter and suitable foraging grounds for the land birds. Muddy area, irrigation ponds, ditches and paddy fields of Paddy Breeding Station provided different food sources like fish, crustaceans, invertebrates, water plants and planktons which further added

to the diversity of birds wet land birds. Based on the abundance (frequency of sightings), 12 species were identified as rare, 16 uncommon, 16 common and 10 occasional. The composition of birds in major feeding guilds in the study area showed that the insectivore guild was the most common with 33.33% species followed by carnivore (25.92%), omnivore (16.67%), grainivore (12.97%), piscivore (9.25%) and nectarivore (1.85%) (Fig. 1). This is in accordance with the study conducted by [9] which recorded a similar trend among the feeding guilds of recorded birds. On comparing the species similarities using the Jaccard's index between the three habitats, taken in pairs it was found that 1.75% similarity was between PBS and Botanical Garden, and 1.81% similarity between PBS and Orchard and maximum similarity (42.85%) was between Botanical Garden and Orchard. The reason for the less similarities between PBS and other two habitats can be correlated with the land characteristics. PBS is dominated by irrigation ponds, muddy area, ditches and rice fields whereas, the other two habitats (Botanical Garden and Orchard) are dominated by plantations and agricultural fields and so the similarity between these two habitats were much higher.

Red wattled lapwing

Common ringed plover

Common pigeon

Rose ringed parakeet

Common hawk cuckoo

Asian koel

Southern coucal

Spotted owlet

Common hoopoe

Indian roller

White throated king fisher

Pied kingfisher

Green bee eater

Brown headed barbet

Copper smith barbet

Flame back

Greater racket tailed drongo

Black drongo

Indian paradise flycatcher

Barn swallow

House crow

Plate 1: Photographs of commonly found birds of Tamil Nadu Agricultural University campus

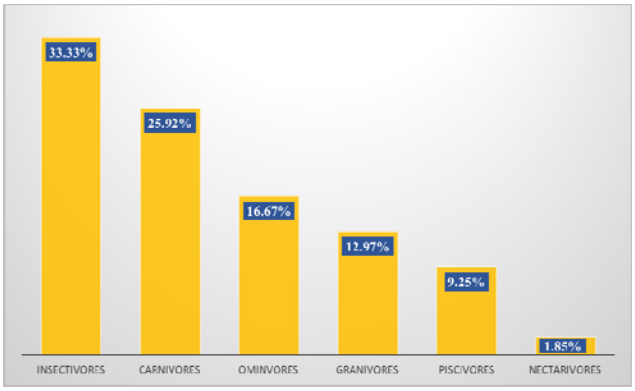

Fig 1: Feeding guild wise percentage of the bird species found at the study site

4. Conclusion

This study gives a new insight, information and knowledge on the avifauna of Coimbatore Tamil Nadu Agricultural University campus. This information will be help in future for species specific work on avifauna and for launching conservation strategies.

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