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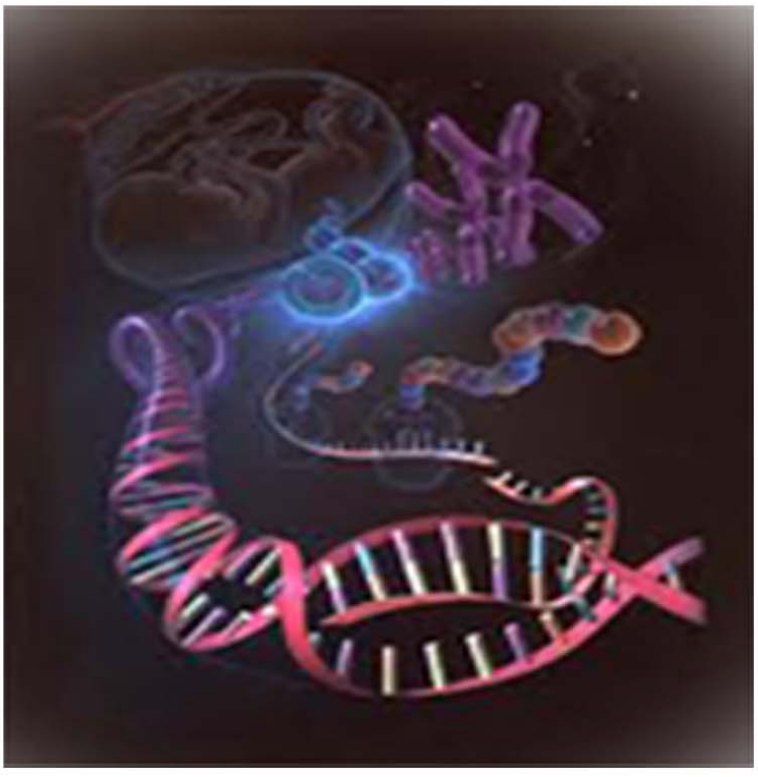

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Research Paper

AVIFAUNAL ASSEMBLAGES IN RELATION TO DIFFERENT CROPLANDS/HABITATS OF NALGONDA DISTRICT, ANDHRA PRADESH, INDIA

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Studies on avifaunal assemblages in relation to different croplands/habitats for this we have applied Euclidean Distance Dendrogam to obtain the use of habitat by different birds in the different crops studied from December 2010 to March 2011, birds were grouped into different categories with reference to the type of crops and habitats.

Keywords: Avifauna, Assemblages, Cropland, India

INTRODUCTION

Bird populations are at risk due to the loss of natural habitats. Birds constitute an important component in the agro-ecosystems, is gaining more and more attention (Dhindsa and Saini, 1994). The role of birds in agriculture is well known (Ali, 1949, 1971). Agricultural ecosystem provides a concentrated and highly predictable source of food to many birds (O'Connor and Shrubb, 1986). This food includes grains, seeds, fruits, green vegetation of the crop plants and grasses, insects, other arthropods, rodents etc., found in the soil, crops and other plants (Dhindsa and Saini, 1994, Asokan *et al.,* 2009). Birds that feed on harmful insects and other pests from the agro-ecosystem are beneficial to agriculturists (Mathew, 1976, Dhindsa, 1986, Toor *et al*., 1986, Dhindsa *et al*., 1988, Dhindsa and Saini, 1994, Sivakumaran and Thiyagesan, 2003, Asokan *et al*., 2009, Asokan *et al.,* 2010, Mehta *et al.,* 2010). These bird groups depend on different types of food in the agro-ecosystem and have evolved various social structure and behavioral responses (Field and Anderson, 2004; Javed and Kaul, 1990; Nocera *et al*., 2007).

Several species of birds are reported to prey on insect pests of agricultural crops in India. In many developing countries like India, agro-ecosystems are not completely modernized. The use of pesticides to control insect pests is avoided in certain areas, especially for low of revenue crops like millet, maize, etc. (Parasharya *et al*., 1994). In such situations, birds become important bio-control agents, suppressing the insect pests.

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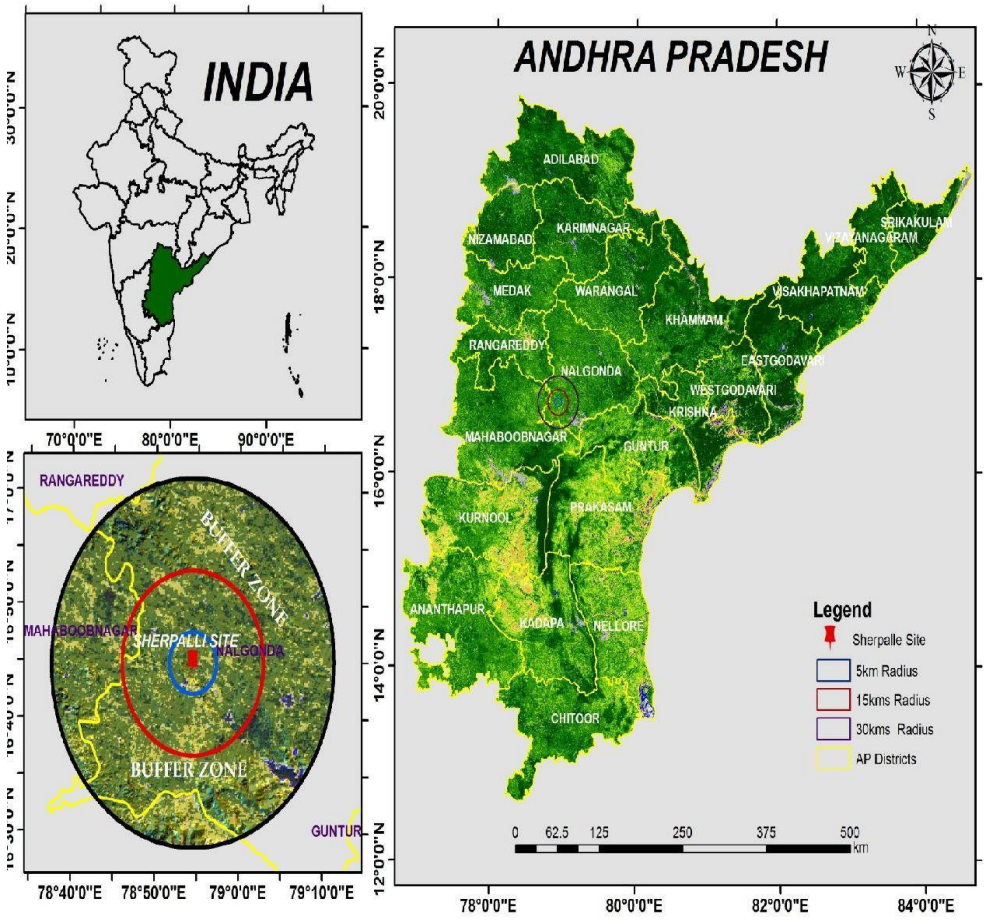
Therefore important predators like insectivorous birds need to be encouraged in the agro-ecosystem by use of appropriate management practices. Since these birds have attracted for many reasons, studies in agricultural ornithology in India have been given low priority (Dhindsa and Sani, 1994) most of the attention is given to threatened species (Mukherjee *et al*., 2002).

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 2011 (Plate 1). 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°032N 78°162E/15.05°N 78.27°E / 15.05; 78.27 with an average elevation of 421 m (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.

Plate 1: Study Area Map (Sherpally Site)



MATERIALS AND METHODS

Estimation of Bird Population

Preliminary survey was made on foot in order to understand the nature of study areas and topography. To estimate the bird population, we have applied point count method (Javed and Kaul, 2002). Four different types of crop varieties were selected, viz., Paddy, Castor, Cotton and Red gram, in addition to Fruit garden (includes *Citrus synensis* and *Musa paridisiaca*) and Open grassland. 1 km transect was laid and at every 200 m distance one point was taken and the bird species were recorded in the 20 m radius (Hostetler and Main, 2001 and Laxmi Narayana *et al.,* 2011) in a duration of 20 min. A total of 48 transects (240 points) were surveyed; bird species, number of individuals, starting and ending time, weather condition, crop type, phenology of the crop, etc., were also recorded. In order to calculate the density, the sighting distance, sighting degree and perpendicular distance was recorded. Bird species were identified using binoculars (7×50) and standard field guides (Ali, 2002, Ali and Ripley, 1987, Grimmett *et al*., 1999b). The bird surveys were carried after two hours of sunrise and before two hours of sunset.

We have applied Euclidean Distance Dendrogram to obtain the use of habitat by different birds in the different habitats.

RESULTS

An examination of assemblages of birds revealed that among the six habitat types among which four different types of crop varieties were selected, viz., Paddy, Castor, Cotton and Red gram, in addition to fruit garden and open grassland (Figures 1-7). The overall bird density (no./sq. km; Mean ± SE) recorded in the six study areas (Sherpally, Mallepally, Dhoniyala, Nalgonda road, Chintachettu thanda and Sagar road) is given in Table 1. In the paddy field, Cattle Egrets (2.94±0.6) were dominated followed by Black Drongo (1.63±0.28), Common Babbler (1.44±0.49) and Small Green Bee-eater (1.40±0.39). However, in the habitat of Castor higher density of Black Drongo (1.86±0.37) was recorded; other dominated species were Large Grey babbler (1.78±0.77), White-throated Munia (1.69±0.47) and Common Babbler (1.31±0.43). Species

Figure 1: Grouping Of Birds Based On Their Similarity In The Paddy Habitat Use For The Entire Study Period From December 2010-March 2011

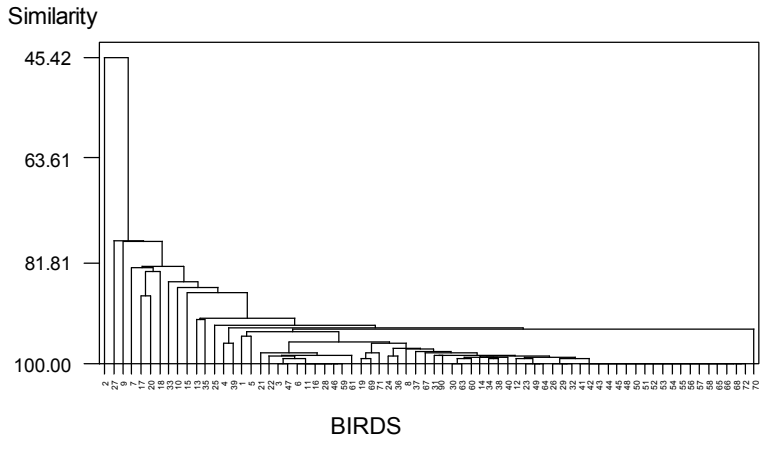


Figure 2: Grouping of Birds Based On Their Similarity In The Castor Habitat Use For The Entire Study Period From December 2010-March 2011

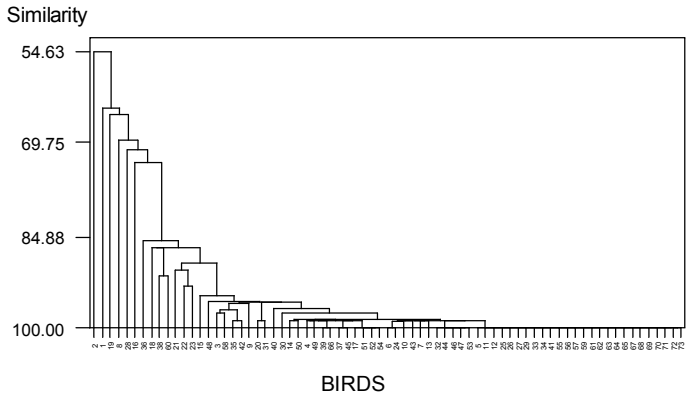


Figure 3: Grouping Of Birds Based On Their Similarity In The Cotton Habitat Use For The Entire Study Period From December 2010-March 2011

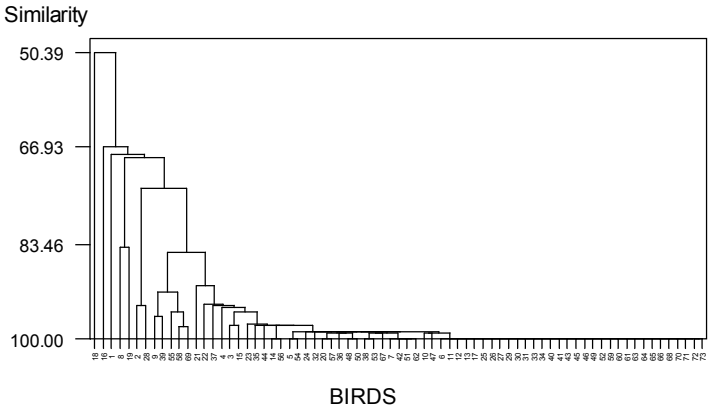


Figure 4: Grouping of Birds Based On Their Similarity In The Red Gram Habitat Use For The Entire Study Period From December 2010-March 2011

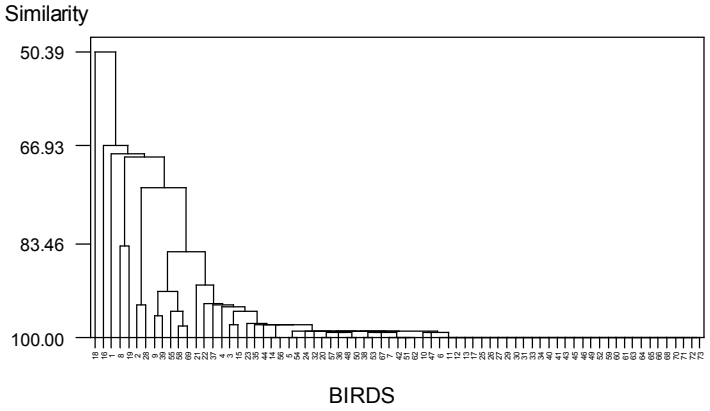


Figure 5: Grouping of Birds Based On Their Similarity In The Fruit Garden Habitat Use For The Entire Study Period From December 2010-March 2011

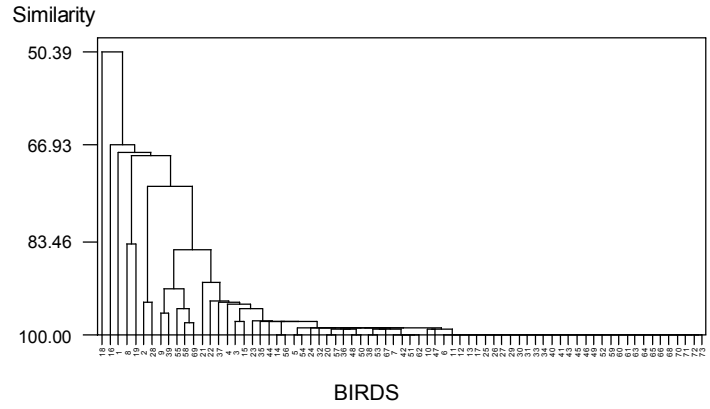


Figure 6: Grouping of Birds Based On Their Similarity In The Open Grassland Habitat Use For The Entire Study Period From December 2010-March 2011

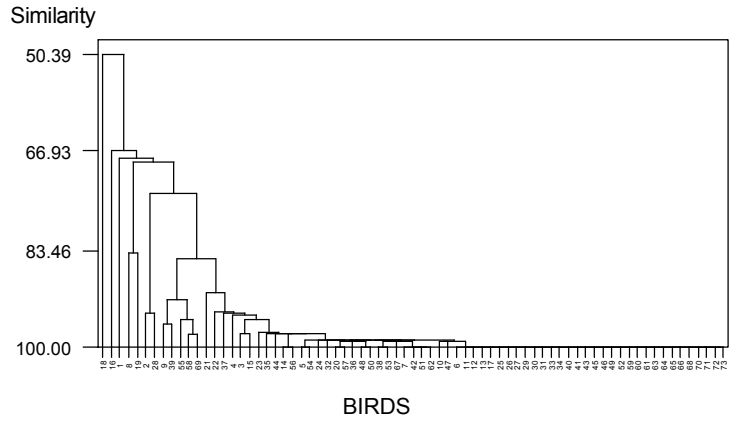
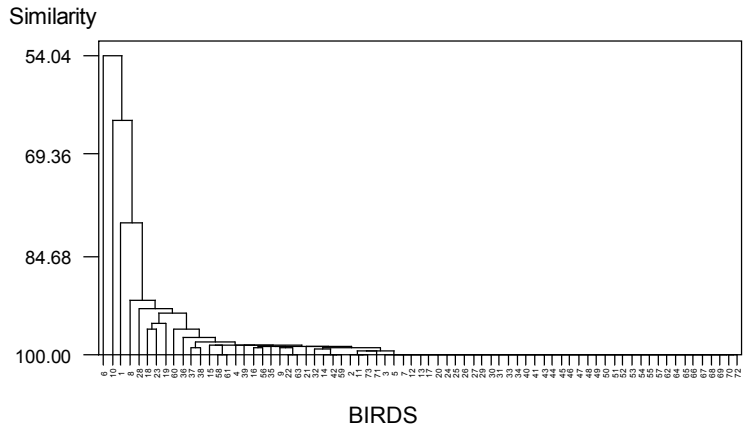


Figure 7: Grouping of Birds Based On Their Similarity In The Overall Habitats Use For The Entire Study Period From December 2010- March 2011



abundance was further changed in Cotton habitat where leading species were Common Myna (4.11±1.38), Common Crow (2.89±1.85), Rose ringed Parakeet (2.00±1.00) and Black Drongo (1.33±0.47). Similarly in Red Gram and Fruit Garden habitats Common Myna was dominated (4.36±1.44; 2.12±0.59) along with Common Babbler and Black Drongo. Open Grassland area was invaded by Ashy Crowned Sparrow Lark (4.71±1.23), Paddy Field Pipit (2.64±1.26) and Black Drongo (1.43±0.35).

ACTIVITY PATTERN

Activity patterns in various habitats namely, Paddy, Cotton, Castor, Red gram, Fruit garden and open grassland. In all the activities, perching was highest in all the habitats. Six major foraging categories of birds were recorded in the six aforesaid habitats. These were insectivorous (43.0%), omnivorous (29.9%), frugivorous (5.6%), granivorous (11.2%), carnivorous (6.5%) and nectarivorous (3.7%). Insectivorous birds were recorded maximum foraging categories in all the habitats (Figure 8).

Table 1: Overall Bird density/Sq.km (Mean ± SE) Recorded in the Different Crop Types/Habitats for the Entire Study Periods from December 2010 to March 2011

Birds Name	Crop Types/Habitats						Overall (*N*=179)
	Paddy (*N*=52)	Castor (*N*=36)	Cotton (*N*=9)	Red gram (*N*=28)	Fruit garden (*N*=26)	Open grassland (*N*=28)	
Indian Pond Heron	0.79±0.200	0.06±0.039	0	0.21±0.150	0.15±0.091	0.07±0.071	0.31±0.070
Little Egret	0.33±0.110	0	0	0.14±0.140	0.15±0.091	0	0.14±0.043
Cattle Egret	2.94±0.600	0.06±0.056	0	0.36±0.720	0.69±0.420	0	1.02±0.210
Median Egret	0.23±0.160	0	0	0	0	0	0.08±0.047
Black Ibis	0.15±0.069	0.03±0.028	0	0	0	0	0.05±0.021
Common Sandpiper	0.67±0.280	0	0	0	0	0	0.20±0.006
Wood Sandpiper	0.04±0.039	0	0	0	0	0	0.11±0.011
Shikra	0.13±0.062	0.03±0.028	0.22±0.150	0.18±0.100	0.12±0.0850	0.04±0.0360	0.11±0.029
Black shouldered kite	0.04±0.039	0.08±0.047	0	0	0.04±0.039	0	0.0.3±0.012
Grey Francolin	0.06±0.043	0.08±0.061	0	0	0	0	0.03±0.081
Common Quail	0.02±0.019	0	0	0	0	0	0.01±0.006
Bush Quail	0	0	0	0	0	0	0
Indian Peafowl	0.15±0.150	0	0	0	0	0	0.04±0.045
White-breasted Water hen	0.06±0.043	0	0	0	0	0	0.20±0.071
Eurasian Collard Dove	0.10±0.050	0.14±0.110	0.89±0.350	0.71±0.071	0.08±0.007	0.18±0.100	0.26±0.071
Spotted Dove	0.19±0.078	0.17±0.100	0.33±0.170	0.54±0.240	0.19±0.079	0.11±0.079	0.23±0.052
Blue Rock Pigeon	0	0.03±0.028	0.011±0.110	0.09±0.009	0	0	0.03±0.018

Table 1 (Cont.)

Birds Name	Crop Types/Habitats						Overall (N=179)
	Paddy (N=52)	Castor (N=36)	Cotton (N=9)	Red gram (N=28)	Fruit garden (N=26)	Open grassland (N=28)	
Red Collared Dove	0.04±0.039	0.11±0.066	0.22±0.220	0.11±0.170	0.58±0.270	0.68±0.360	0.42±0.890
Rose-ringed Parakeet	0.08±0.054	011±0.110	2.00±1.00	0.43±0.430	0.31±0.310	0.18±0.120	0.28±0.100
Plum-headed Parakeet	0	0.03±0.028	0.11±0.110	0.07±0.050	0.04±0.039	0	0.02±0.110
Brain Fever Bird	0.08±0.046	0	0	0	0	0	0.02±0.014
Asian Koel	0.04±0.027	0.08±0.047	0	0	0	0	0.03±0.012
Pied Crested Cuckoo	0.04±0.027	0	0	0	0	0	0.01±0.008
House Swift	0.38±0.200	0	0	0	0	0	0.11±0.058
Asian Palm Swift	0.42±0.180	0.11±0.110	0	0	0.38±0.270	0	0.02±0.013
Indian Roller	0.17±0.090	0.11±0.53	0.78±0.430	0.54±0.220	0.58±0.240	0.14±0.110	0.30±0.063
Small Green Bee- eater	1.40±0.390	0.78±0.250	0.56±0.290	1.11±0.0360	0.04±0.039	0	0.07±0.029
Blue-tailed Bee –eater	0	0	0	0	0.15±0.150	0	0.03±0.023
White-breasted Kingfisher	0.44±0.150	0	0	0	0.58±0.460	0.04±0.036	0.22±0.081
Common Hoopoe	0.02±0.019	0.33±0.200	0	0	0	0	0.05±0.040
Red-vented Bulbul	0.19±0.110	0.47±0.170	0.67±0.330	0.29±0.200	0.50±0.190	0.04±0.036	0.36±0.059
White browed Bulbul	0.13±0.087	0	0	0	0	0	0.04±0.026
Loten's Sunbird	0	0	0.06±0.039	0.22±0.150	0	0.31±0.130	0.07±0.0213
Purple Sunbird	0	0.03±0.028	0.22±0.150	0	0.23±0.230	0.18±0.180	0.35±0.110
Purple-rumped Sunbird	0	0.03±0.028	0.11±0.110	0.140±0.140	0.50±0.230	0	0.11±0.042
House Crow	0.94±0.270	1.19±0.440	2.89±1.850	0.25±0.810	0.42±0.180	0.14±0.085	1.09±0.200
Rufous Treepie	0	0	0	0.16±0.0160	0	0.07±0.071	0.04±0.027
Common Babbler	1.44±0.490	1.31±0.430	1.33±0.900	1.68±0.480	1.46±0.560	0.64±0.370	1.32±0.210
Large Grey Babbler	0.40±0.180	1.78±0.770	0.89±0.590	0.590±0.720	0.46±0.260	0.04±0.036	0.83±0.210
Indian Robin	0.12±0.065	0.44±0.150	0.11±0.110	0.14±0.110	0.15±0.072	0.18±0.100	0.26±0.051
Booted Warbler	0	0	0.22±0.150	0.33±0.036	0	0	0.02±0.010
Pied Bush-Chat	0.13±0.087	0.11±0.053	0	0.04±0.500	0.62±0.290	0.86±0.320	0.18±0.039
Oriental Magpie Robin	0.15±0.150	0.03±0.028	0	0.07±0.071	0.39±0.039	0	0.07±0.047
Streaked Fantail-Warbler	0.17±0.090	0.17±0.075	0	0	0.11±0.079	0	0.10±0.033
Plain Prinia	0	0.03±0.028	0.06±0.240	0.00±0.085	0.04±0.039	0	0.06±0.021

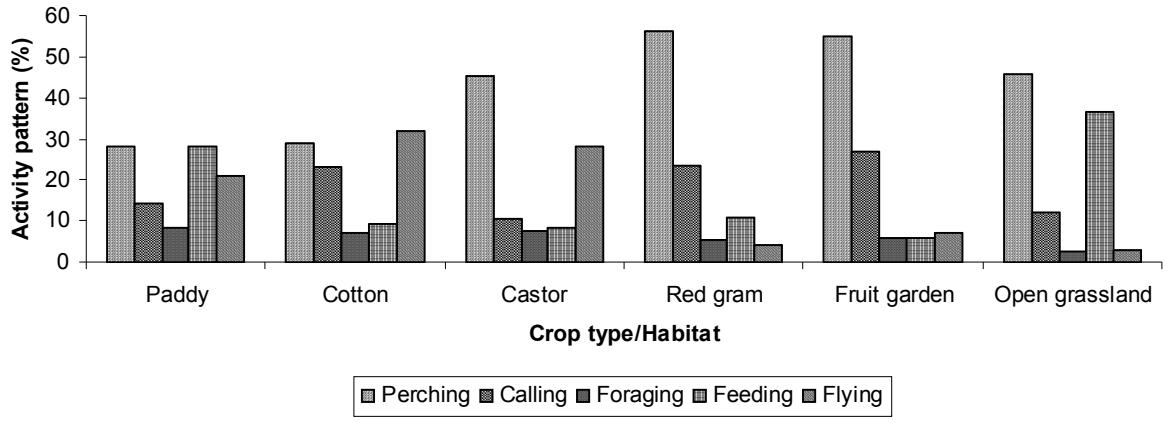
Table 1 (Cont.)

Birds Name	Crop Types/Habitats						Overall (N=179)
	Paddy (N=52)	Castor (N=36)	Cotton (N=9)	Red gram (N=28)	Fruit garden (N=26)	Open grassland (N=28)	
Ashy Prinia	0	0.17±0.170	0.11±0.110	0.07±0.071	0.08±0.077	0.077±0.071	0.07±0.025
Franklins Prinia	0	0.30±0.028	0.22±0.150	0	0.31±0.130	0	0.07±0.023
Common Wood Shrike	0.10±0.079	0.	0	0	0	0	0.03±0.024
Brahminy Starling	0.63±0.240	0.47±0.350	0	0.07±0.400	0	0.32±0.0.150	0.20±0.690
Common Iora	0	0	0	0	0	0	0
Tickell's Flower-pecker	0	0	0	0	0.23±0.120	0.07±0.071	0.04±0.021
Common Tailor bird	0.19±0.099	0.50±0.120	0.33±0.170	0.71±0.0.440	0.27±0.170	0.11±0.079	0.82±0. 150
Bay backed shrike	0.12±0.053	0.06±0.039	0.11±0.110	0.61±0.085	0.08±0.053	0.32±0.150	0.21±0.046
Black Drongo	1.63±0.280	1.86±0.370	1.33±0.470	1.14±0.280	1.85±0.470	1.43±0.350	1.59±0.150
Ashy crowned Sparrow Lark	0.15±0.150	0.06±0.056	0	0	0.46±0.260	4.71±1.230	0.92±0.230
Singing Lark	0	0	0.08±0.047	0.11±0.079	0.15±0.091	0	0.02±0.013
Spotted Munia	0	0.11±0.077	0	0.12±0.079	0	0	0.06±0.030
Red Munia	0	0.17±0.0170	0	0	0	0	0.03±0.034
Black headed Munia	0.15±0.150	0.33±0.250	0	0	0	0.29±0.0290	0.16±0.080
White-Throated Munia	0.90±0.390	1.69±0.470	0.44±0.440	1.36±0.110	0.27±0.120	0.21±0.210	0.18±0.039
Yellow-Throated Sparrow	0.15±0.150	0	0	0	0	0	0.04±0.045
House Sparrow	0.15±0.150	0.06±0.056	0	0.07±0.071	0	0	0.07±0.047
Yellow wagtail	0.02±0.019	0	0	0	0	0	0.01±0.006
White Wagtail	0.02±0.019	0	0	0	0	0	0.03±0.017
Paddy field Pipit	1.17±0.330	014±0.81	0	0.04±0.036	0	2.64±1.260	0.79±0.230
Common Myna	1.23±0.280	0.83±0.310	4.11±1.380	4.36±1.440	2.12±0.590	0.82±0.360	1.85±0.290

DISCUSSION

Results of the present study show that the study area is an ideal habitat for terrestrial bird species. Red-vented Bulbul, Common Babbler, Common Myna, Black Drongo, Small Green Bee-eater were widespread and common species occurring abundantly in all habitats. Black Drongo was observed as the most dominant bird during the study period. These generalist birds are capable of thriving in a variety of habitats. Generalist is any phenotype whose fitness in one patch preciously equals its fitness in the other (Rosenzweig, 1981). Though Common Crow was common species but was not recorded in all the habitats during the study period.

Figure 8: Bird's Activity Patterns In Various Crop Type/Habitats



However, different phonologies of mentioned crop varieties were observed, i.e., Paddy, sapling, seeding, and harvesting; in Castor, flowering, seeding and harvesting; in Cotton, Ripening and harvesting; in Red gram, flowering, seeding, and harvesting; in Fruit garden, flowering and fruiting.

The trends indicate that shrubs attract more number of insectivorous birds by providing the required food resources to them. Besides the food supply, the shrubs also serve as ideal perching sites for the insectivore birds. Insectivores and omnivores are abundant in various habitat types.

Foraging categories of birds revealed that insectivorous were recorded in high percentage in all habitats. A few graminivorous and nectarivorous bird species were recorded during the study period as there were no such flowering and fruiting crops (Red gram, Fruit garden).

Bird species richness and community structure differ from region to region (Richards, 1969, Pearson, 1975, Karr, 1976). Because these habitats are comprised of more resources in terms of shrubs and food source, which will provide the feeding and foraging sites for birds (especially insectivorous birds). Species diversity was observed to be the highest in Paddy, and lowest in Cotton, It is because the Paddy comprises of more number of sources (food, feeding sites, roosting, nesting sites, etc.), whereas the Cotton provide lowest resources. The avian diversity of an area indicates the health of that ecosystem. They are highly mobile vertebrates and easily observed indicators of change. In recent year's loss of primary forest has been intensified more rapidly due to various reasons (Raman and Sukumar, 2002). Bird community studies have been frequently used for conservation assessment and monitoring (Daniels, 1989; Furness and Greenwood, 1993). Research at community level of birds in the Indian subcontinent is essential as large-scale changes have been taking place in natural habitat of birds (Khan *et al.,* 1993). A thorough understanding of the effect of habitat on birds may also help in predicting the effects of management on bird population (Javed and Kaul, 2002). Density and diversity are very useful attributes and are valuable indicators of habitat quality and have great significance from the management perspective (Javed, 1996).

The Andhra Pradesh government has taken all measures to increase the percentage of land

under cultivation by expending irrigation facilities. The emphasis was not only on major irrigation projects but area specific and need specific; minor and lift irrigation projects were also given predominant importance. In the Nalgonda, grassland and other agricultural ecosystems have declined and represent a small percentage of land within an agriculturally dominated landscape, but these habitats are disproportionately important to birds. Because of the limited habitat availability to species depending on grassland or agricultural ecosystems, agriculturally-mediated changes can have profound implications for the management and sustainability of bird populations. There is also supporting evidence that production of agriculturally managed wetlands for water and pollution management purposes can exhibit biodiversity benefits (Pearson, 1975).

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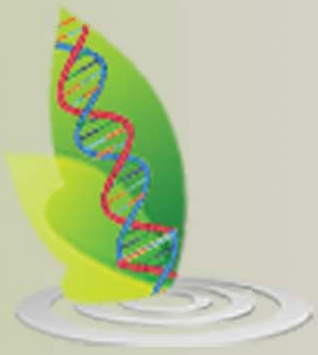

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