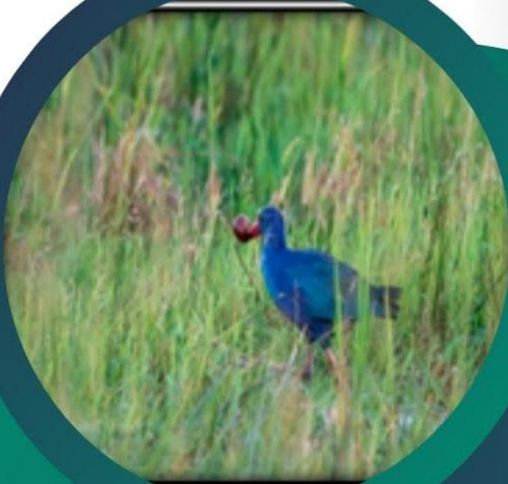




AVIAN DIVERSITY IN DIFFERENT AGRO-ECOSYSTEM OF ASSAM

ALL INDIA NETWORK PROJECT ON VERTEBRATE PEST MANAGEMENT,
ASSAM AGRICULTURAL UNIVERSITY,
ZONAL RESEARCH STATION, NORTH LAKHIMPUR

**PRABAL SAIKA, TANBIR HAZARIKA, BITHIKA PHUKAN,
PINKU PROTIM GOGOI & VIPIN CHAUDHARY**
ASSAM AGRICULTURAL UNIVERSITY-
ZONAL RESEARCH STATION, NORTH LAKHIMPUR



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AVI AND DIVERSITY IN DIFFERENT AGRO-ECOSYSTEM OF ASSAM

Compiled and Edited by

Prabal Saika

Tanbir Hazarika

Bithika Phukan

Pinku Protim Gogoi

Vipin Chaudhary (CAZRI, Jodhpur)

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I.INTRODUCTION

Northeast India is well known for its very rich agro biodiversity attributed mainly to wide variation in the physiographic and agro-climatic conditions. Assam is located in the north-eastern part of India (24⁰09" – 27⁰58" N latitudes and 89⁰42" – 96⁰01" E Longitudes). The state is also part of two Endemic Bird Areas, Assam Plains and Eastern Himalaya. Assam covers an area of 78,500 km² and is divided into 35 districts. Physiographically, the major parts of Assam are plains with the Brahmaputra valley accounting for more than 60% of the total area of the state. The other plain area is in the south, the valley of the Barak River. The main hilly areas are the Barail Range and Karbi Plateau.

The climate is basically subtropical with mean annual rainfall varying from 1500 mm to 3750 mm and the annual temperature from 5⁰ C to about 37⁰ C. The average relative humidity ranges between 65 % and 95%. Assam is a transitional area of two hot spots viz., Himalayan and Indo- Burma hot spot. It is also considered as a part of north eastern bio geographical zone of India. Agro biodiversity is a key component for sustainable development. Birds constitute an important component in the agro-ecosystems. These bird groups depend on different types of food in agro-ecosystem and have evolved various social structures and behavioural responses (Javed and Kaul, 2002). The state of Assam is very rich in avifaunal diversity consisting of more than 900 species and subspecies, out of 1300 species found in India (Choudhury, 2000).

Although Assam is predominantly an agrarian state, studies in agricultural ornithology and other aspects of applied research were largely ignored until 2009. Some distributional and taxonomical aspects of wetland, forest and grassland birds have been studied by few researchers of the state (Bhattacharjee et al., 1998). Therefore, a study was conducted on birds in relation to agriculture in Assam. The major objective of the present study is to assess the density and diversity of different bird species in the agricultural landscape.

Bird survey and Census

Bird survey was conducted using a field binocular (8x40). Photographs were taken whenever necessary. Identification was done using standard field guides (Grimmett et al.; 1999). Bird census was also conducted in different seasons in the different agro-ecosystems of Rice-Rice, Rice-Mustard, Rice-Maize, Tea, Maize, homestead garden and open grassland as well as wetlands adjacent to paddy field were selected to study the bird communities using Point count method (Hostetler and

Main, 2001). Observations were made between 7:00 and 9:00 A.M. Shannon-Wiener Index of Diversity and Evenness was calculated using the Windows based software Biodiversity Professional.

II. CHRONOLOGICAL FINDINGS ON YEAR-WISE HABITAT ANALYSIS OF BIRDS IN DIFFERENT AGRO-CLIMATIC ZONE OF ASSAM FROM 2009-2024.

The study was carried out in the 11 districts under five agro climatic Zones of Assam during 2009 to 2012 by doing survey following Line Transact method for sampling major crops viz., paddy, Mustard (*Toria*), Tea, Maize and homestead garden (*Bari* system).

RESULTS :

A total of 141 species of birds belonging to 18 orders and 49 families were recorded in agricultural landscape of 5 agro-climatic zones of Brahmaputra and Barak valley (Table 1) of which 74 species are common (seen commonly in the study area), 56 are abundant (seen very commonly in most habitats in most of the field visit) and are 11 Rare (seen only once or twice). Different bird's species associated with different crops. Diversity indices of birds recorded from various microhabitats of paddy agro-ecosystem revealed highest Shannon-Weiner Index (H') of 2.42 in freshly ploughed paddy field with 0.78 Evenness (J') followed by milky grain & ripening stage ($H' = 2.33$) (Table 2).

The bird species which are occurring in paddy field experimental field showed variation in their utilization pattern. Among species recorded, 62% of birds solely utilize for feeding, 8% for food and roosting 9% each for food and cover, food and nesting and 12% for food, cover and nesting. The feeding guilds of birds recorded in rice fields grouped into 9 types and they exploit different prey types. Birds were observed to adopt different feeding methods and the species were grouped in to 8 foraging guilds. The survey in the organic rice area clearly indicated that the occurrences of insectivorous birds were very high in organic farms and their diversity and density was significantly greater than conventional farms. A total of 43 species recorded in Homestead garden (Table 3) with 2.91 Shannon-Weiner Index (H') followed by 17 bird species ($H' = 2.33$) in different growth stages of mustard crop field which was 17.7 % occurrence in relation to total birds recorded in Agricultural Landscape (Table 4).

Total 55 species of birds were recorded from study area starting from seed sowing to harvesting stage of paddy crop growth. Results revealed that total 19 species birds during seedling stage, 16 species birds during transplanting; 28 species during maximum tillering stage; 27 species during milky stage; 24 species at ripening stage and 21 species in harvested paddy field against 17 and 22 species in fallow and freshly ploughed paddy field respectively.

Table 1. Taxonomic composition and abundance of birds in agricultural landscape of Assam

Order	Family	Species	Common	Abundant	Rare
18	49	141	74	56	11

Table 2. Diversity indices of birds recorded from various microhabitats of paddy agro-ecosystem

Sl No	Habitat	Shannon-Weiner Index(H')	Evenness (J')
1.	Fallow	2.12	0.75
2	Freshly Ploughed	2.42	0.78
3	Nursery	2.10	0.72
4	Transplanting/Tillering	1.66	0.60
5	Milky & Ripening stage	2.33	0.76
6	Harvesting/Harvested	1.96	0.72

Table 3. Diversity indices of birds recorded in Homestead

Individual (No)	Shannon-Weiner Index(H')	Evenness (J)
275	2.91	0.87

Table 4. Diversity indices of birds recorded in Mustard Field

Shannon-Weiner Index (H _s)	Evenness (J _s)
2.5	0.95

Detailed breeding activities of Eurasian Tree species in Nest box

Eurasian Tree sparrow Breeds in Unused refrigerator, AC box, behind signboard, open almirah, inside lab equipment, wooden electric switchboard, honeybee box, table drawer. The feeding, breeding nesting and roosting habit is similar to House Sparrow. Wooden nest box and shoe box were placed in office building of RARS, Assam Agricultural University, Lakhimpur during the second week of February, 2010(9.2.10). Pair of Tree sparrows occupied 80 per cent of nest box in the month of March and completed nest making. First group of nestlings came out of nest box during the first week of May (from 3rd May onwards). Two juvenile found dead in shoe box nest on 14 June, 2010. It was noticed on 18 June that the breeding adult put few bird feathers and weeds in the same nest and completed the process within a week. Found 4 numbers of eggs on 30 June. The juveniles came out of the nest on 6 August, 2010. The breeding process of Eurasian Tree Sparrow completed between March and August. The egg hatching success and breeding success was 85.18% and 74.04% respectively (Anonymous, 2012).

1.11 Feeding Ecology

Food habit of spotted Owlet was studied with 22 pellets collected from three locations of RARS, North Lakhimpur campus. Amongst the prey items, insects (76.8%) were most dominant food item eaten by owlet as compared to small mammals (2.2%) and unidentified vertebrates (21%). The insects belong to the order Coleoptera and Orthoptera constituted the major prey item of the spotted owlet.

Food composition of Eurasian Tree sparrow: Nest boxes occupied by the Eurasian Tree Sparrow (*Passer montanus*) were checked throughout the breeding season for food remains. In the prey remains collected from the nest and its vicinity recorded 80.69% insect's pupae, larvae and nymph of pygmy grasshopper. The result is presented below;

Insects	80.69%
Weed seed	14.03%
Paddy grain	5.26%

Feeding ecology of Oriental Magpie Robin

Oriental Magpie Robin was preying on insects in homestead, kitchen, paddy nursery, harvested field. Orthopteran, Lepidoptern, Dipteran and white grubs are preferred by the Robin.

SURVEY PERIOD 2015 – 2016

- The community structure of birds and their study was conducted in paddy – mustard cropping system during *therabi* season and in homestead garden during the year 2015-16.
- A total of 17 species of bird were recorded in mustard ecosystem. Common myna and jungle myna were found to be predominant species followed by white wagtail, shrike, stonechat and plaintive cuckoo among the predatory omnivorous and insectivorous.
- Species richness was found to be more in early maturity stage followed by pod formation stage of mustard crop sown after harvesting of *Salirice*. Shrikes were found to feed voraciously Mustard aphids where as Plaintive cuckoo and the mynas feeds on mustard sawfly larvae.
- Green bee eaters were found to catch honey bees. 31 spp of birds recorded with 2.44 diversity index. 3 spp of Barbet in homestead eco system was recorded Barbet's feeding, nesting and breeding ecology was studied. Four spp recorded in study area (RARS, NL), Spotted Dove was the most abundant followed by Rock Pigeon. Population was more in the month of February. Among the spp only Green Pigeon preferred uncultivated area with indigenous trees

SURVEY PERIOD 2016 – 2017

- The community structure of birds and their study was conducted in paddy – mustard cropping system during *therabi* season. 17 species of bird were recorded in mustard ecosystem. Common myna and jungle myna were found to be predominant species followed by white wagtail, shrike, stonechat and plaintive cuckoo among the predatory omnivorous and insectivorous.
- Species richness was found to be more in early maturity stage followed by pod formation stage of mustard crop sown after harvesting of *Salirice* .
- Shrikes were found to feed voraciously Mustard aphids where as Plaintive cuckoo and the mynas feeds on mustard sawfly larvae. Green bee eaters were found to catch honey bees

SURVEY PERIOD 2018 – 2019

- A total of 90 species belongs to 38 families were recorded in the upper and lower Brahmaputra valley zone of Assam.
- The highest (8) no of species belongs to the family Anatidae followed by Ardeidae (7) and Motacillidae (6) while only one species each was observed under the family Upupidae, Rostratulidae, Rhipiduridae, Rafinesque,

Pycnonotidae, Podicipodidae, Ploceidae, Phasianidae, Paridae, Oriolidae, Estrildidae, Dicru ridae, Cisiticolidae, Capitonidae, Alaudidae

SURVEY PERIOD 2019 – 2020

- Studies were conducted in different districts of Assam in Rice/Rice cropping system. A total of 3028 individuals of birds were recorded in Lakhimpur district followed by 2229 in Sivasagar whereas 100 individuals of birds were recorded in Golaghat district during the survey period.
- The species richness ranged from 14 to 37 in different districts and recorded highest in Dibrugarh district with diversity index of 2.66
- 18 species of birds were almost common in all the 6 districts (table 1) and recorded a higher abundance of common Myna (22.22%) was observed in Majuli district followed by Bongaigoan district (21.82%)

SURVEY PERIOD 2021 – 2022

Surveillance of birds following line transect method

Results:

- Cattle egret was observed to be the most abundant species.
- 6478 No. of individual birds was observed with 0.13 evenness among the birds
- Species richness was 14 with 1.8 diversity index (table 1)
- Species richness in paddy-paddy cropping system was observed to be 63 with diversity 1.54 and in paddy-maize cropping system, it was observed to be 28 species with 1.21 diversity. (table 2)
- Insectivorous birds were the highly occurred bird while observing the foraging guild in both paddy and maize crop ecosystem (table 3)
- Results on five multi location trials and one location specific trial conducted during the year 2021-22 (June to May) was presented. Habitat analysis and distribution of major depredatory birds viz., Weaver birds and mixed roost analysis was carried out. GPS based Survey on roosting sites on depredatory birds in North Bank Plain Zone of Assam reported as 3 large mix roosts, 2 large communal roosts and one medium communal roost.
- Species richness in paddy-paddy cropping system was observed to be 63 with diversity index 1.54 while in paddy-maize cropping system, it was observed to be 28 species with 1.21 diversity index.
- Three species of depredatory weaver birds was recorded and identified as Streaked weaver *Ploceus manyar*, Black-breasted weaver *P. benghalensis* and Baya weaver *P. philippinus* in Assam agro ecosystems. Baya weaver colony

was found to be relatively abundant than two other recorded species with 84.2% abundance followed by Streaked weaver (11.18%) and Black-breasted weaver (4.61).

SURVEY PERIOD 2022 – 2023

125 Bird spp recoded during the survey period 2022 – 2023. Barn swallow was observed to be the most abundant species followed by cattle Egret and Common Myna. 2226 No. of individual birds was observed in survey locations of 10 districts. Highest 25 bird species recorded in Goalpara district followed by Lakhimpur (24) and Biswanath (20). Highest number of bird individuals recorded in the month of November followed by August. Diversity index varies between 1.6 to 2.8 and birds are found to be evenly distributed in the entire district except in Goalpara district. 41 species birds from 497 individuals recorded from the survey conducted in 3 locations of Sivasagar district with diversity index of 2.44. Common Myna was found to be most dominant species in homestead garden.

The surveillance conducted during *Rabi* season at AAU-ZRS, Lakhimpur revealed 32 species predatory birds with 49.57 densities against only 4 species of depredatory birds with a density of 41.71.8 species of depredatory birds found to cause extensive damage to different cereal (Rice), Maize, ber (Jujube) fruit, Guava and sugarcane crops in three districts *viz.*, Lakhimpur, Golaghat and Darrang district of Assam

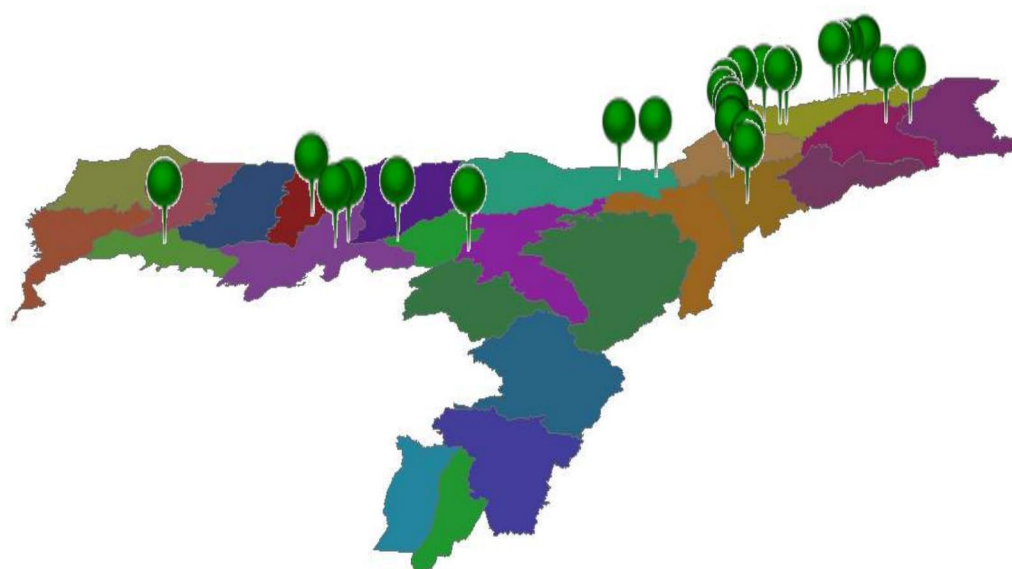


Map 1: Bird population & GPS location in different districts of Assam

Table5: Relative abundance (%) of important bird species in rice field of different district of Assam during *Rabi* season 2022-23

Sl. No.	Birds Species	% Abundance in different districts									
		Guwahati	Morigaon	Goalpara	Nalbari	Biswanath	Lakhimpur	Dhemaji	Sivsagar	Dibrugarh	Tinsukia
1	Lesser whistling Duck	0.00	10.61	0.00	15.79	13.16	6.20	0.00	0.00	3.33	6.45
2	Spotted Dove	8.00	7.58	3.32	2.63	13.16	11.24	11.20	4.08	0.00	3.23
3	Red Wattle lapwing	0.00	3.03	3.79	10.53	0.88	7.75	1.60	5.10	3.33	6.45
4	Asian Openbill	12.00	7.58	0.47	2.63	3.95	2.33	3.20	0.00	0.00	0.00
5	Little Cormorant	12.00	0.00	0.95	6.58	0.00	4.26	4.00	0.00	0.00	0.00
6	Cattle Egret	0.00	10.61	0.00	3.95	6.14	6.20	6.40	32.14	30.00	19.35
7	Pond Heron	0.00	1.52	4.74	0.00	0.88	3.49	10.40	9.69	0.00	6.45
8	Kingfisher	0.00	0.00	2.37	2.63	2.63	1.55	4.00	1.02	20.00	0.00
9	House Sparrow	0.00	0.00	0.00	0.00	2.19	0.00	0.00	0.00	0.00	0.00
10	Black Drongo	4.00	0.00	0.47	11.84	3.07	4.65	11.20	8.16	0.00	0.00
11	Common Myna	12.00	1.52	7.39	10.53	11.40	9.30	17.60	5.10	23.33	22.58
12	Baya weaver	0.00	4.55	0.00	0.00	0.88	5.81	0.00	1.02	0.00	0.00
13	Barn swallow	0.00	9.09	37.91	0.00	19.74	5.84	0.00	0.00	0.00	0.00
14	Grey backed shrike	4.00	1.52	3.79	0.00	0.00	0.77	0.00	32.14	0.00	0.00
15	Red vented bulbul	0.00	3.03	0.95	0.00	3.07	3.87	11.20	10.20	0.00	0.00
16	White Wagtail	0.00	4.55	9.00	0.00	0.00	4.26	1.60	5.10	0.00	0.00
17	Tree sparrow	8.00	3.03	0.00	0.00	0.00	3.10	0.00	0.00	0.00	0.00
18	Stonechat	0.00	0.00	1.90	0.00	0.00	2.71	0.00	1.02	0.00	0.00
19	Starling	0.00	7.58	13.74	0.00	2.63	5.42	15.20	10.20	3.33	0.00
20	Green Bee Eater	0.00	3.03	0.95	0.00	2.19	1.16	0.80	1.53	0.00	0.00
21	Koel	8.00	0.00	0.47	10.53	2.19	0.00	0.00	5.10	0.00	9.68
22	Pigeon	16.00	0.00	1.90	11.84	6.58	0.00	0.00	9.18	0.00	0.00
23	Crow	8.00	3.03	0.95	5.26	0.44	0.39	0.00	0.00	16.67	0.00

24	Rose ringed Parakeet	4.00	3.03	0.47	0.00	0.88	0.00	0.00	0.00	0.00	16.13
25	Tailor bird	4.00	0.00	0.47	5.26	3.95	0.00	1.60	0.00	0.00	9.68
26	Warbler	0.00	4.55	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00
27	Magpie Robin	0.00	3.03	0.95	0.00	0.00	0.00	0.0	0.00	0.00	0.00
28	Barbeet	0.00	7.58	0.47	0.00	0.00	0.00	0.0	8.16	0.00	0.00
29	Munia	0.00	0.00	3.32	0.00	0.00	0.00	0.0	0.00	0.00	0.00
30	Adjustant Stork	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.59	0.00	0.00
	Species richness	12.00	20.00	25.00	13.00	20.00	24.00	14.00	15.00	7.00	9.00
	Shanon H	2.30	2.80	2.30	2.40	2.50	2.80	2.30	2.00	1.60	2.00
	Eveness	0.19	0.14	0.09	0.18	0.12	0.11	0.16	0.13	0.20	0.20



Map 2. GIS based Survey points in different districts of Assam

Surveillance of Birds in Boro paddy field 2022-23

Location: ZRS, Lakhimpur, Area covered: 5000 sqmt

Table 6: No. of Bird Population in Boro Rice Season

Bird Species	No. of Bird Individual in Boro Rice season			total
	30 April 2022	10 Oct 2022	28 June 2023	
Baya Weaver		157		157
Black Drongo	6	6	7	19
Brown Shrike	-	2		2
Cattle Egret	25	5	26	56

Pond Heron	18			18
Grey –backed Shrike	2	2		4
Long tailed shrike		1		1
Spotted Owlet	8		3	11
Spotted Dove			13	13
Stone chat		3		3
Common Myna	16	12	14	42
Jungle Myna	12		11	23
Pied Starling	4	6	8	18
Citine Wagtail	14			14
PaddyfieldPippit	1			1
Rose Ringed parakeet		12		12
White throated Kingfisher	1			1
Red Wattled Lapwing	4	3	5	12
Lesser Whistling Teal	2			2
Cotton Teal	2			2
Little Adjutant Storck	2		4	6
Asian Open Bill	6		7	13
Common Teal	14			14
Green Bee eater			10	10
White breasted water hen			6	6
Red vented Bulbul			5	5
Eurasian Tree Sparrow	19	12	22	53
Scaly breasted Munia		135		135

Bird Density : Predatory birds = 49.57 (32 spp), depredatory = 41.71 (4 spp)

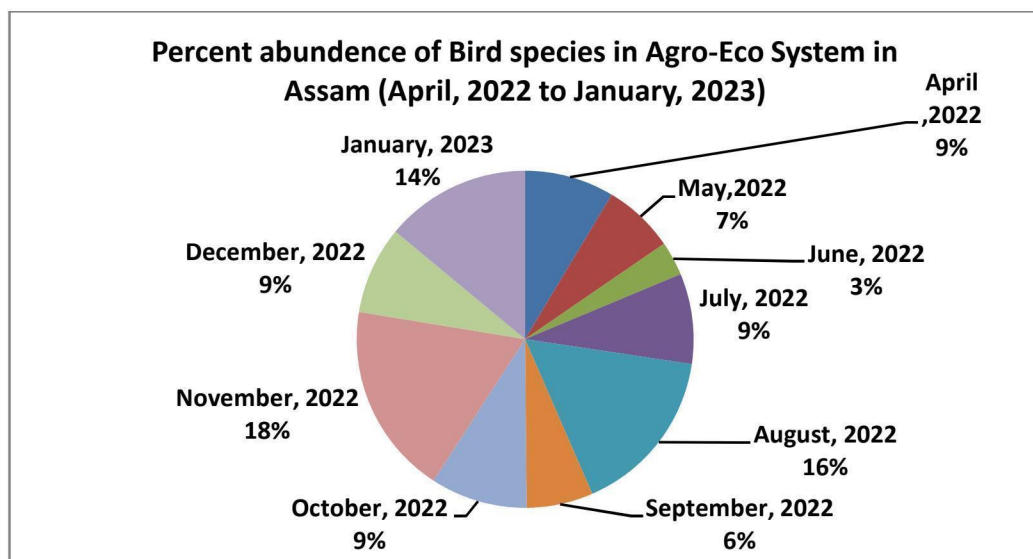


Fig.1 Per cent Bird abundance during the survey periods (April 22 to January 2023)

III. Avian diversity in Assam

A total of 2465 number of bird individuals were observed at AAU-ZRS, North Lakhimpur during the year 2024-25. Highest number of total individual birds was recorded in the month of October followed by June. The surveillance revealed 19 species of predatory birds against only 6 species of depredatory bird species in different Agro-Ecosystem at AAU-ZRS, North Lakhimpur campus. Barn Swallow was noticed to be most abundant while species richness was observed to be highest in the month of November and December.

TABLE- 7: DIVERSITY INDEX OF BIRD POPULATION IN RICE-RICE, RICE-MUSTARD, RICE-MAIZE ECOSYSTEM OF AAU-ZRS, NL

Individual (No.)	Species Richness (<i>Menhinick Index</i>)	Shannon Weiner Index (H ₁)	Evenness (J ₁)
2465	25	2.4314069	0.755359055

A survey was carried on 13 districts of Assam covering three Agro-climatic zones viz., North Bank Plain Zone, Upper Brahmaputra Valley Zone & Central Brahmaputra Valley Zone. Total 4099 bird individuals were recorded with highest species richness observed in Jorhat followed by Darrang district and total number of individual bird species was recorded to be highest in Darrang district. Jorhat district recorded highest Shannon index of 3.73 followed by Nagaon district. (3.61).

New addition in the checklist of birds in agricultural landscape of Assam

- Indian Peafowl in Narayanguri in Baksa district near Manas National Park,
- Swamp francolin in Baksa, Biswanath & Golaghat, Bengal Florican & Blue – breasted Quail in Baksa

TABLE-8: DIVERSITY INDICES OF BIRDS IN DIFFERENT DISTRICTS OF ASSAM DURING 2024-25

Diversity indices	Jorhat	Sivasagar	Charaidoo	Golaghat	Nagaon	Morigaon	Darrang	Biswanath	Sonitpur	Majuli	Tinsukia	Udalguri	Dhemajee
Species Richness	69.0	44.0	26.0	32.0	54.0	33.0	57.0	45.0	23.0	40.0	29.0	25.0	54.0
Shannon H	3.73	2.90	2.10	3.01	3.61	1.75	2.80	2.40	2.57	2.86	2.64	2.85	3.26
Evenness	0.88	0.76	0.64	0.86	0.90	0.50	0.69	0.63	0.81	0.77	0.78	0.88	0.81

IV. PURPLE MOORHEN: DISTRIBUTION OF PURPLE MOORHEN IN ASSAM

A total of 187 number of adult purple moorhen individuals were observed in different locations of Sivasagar, Majuli, Lakhimpur, Dhemaji and Jorhat districts of Assam, covering North Bank plain zone and Upper Brahmaputra valley zone of Assam from July to September, 2025 in *Baopaddy* fields and were found damaging the crop during early morning and late evening, mostly the vegetative stage of the crop. An average transect walk of 360.86m was done and an average 8.91% of damage was observed.

TABLE-9 AVIAN DIVERSITY AT AAU-ZRS, NORTH LAKHIMPUR.

Sl. No	Common Name	Scientific name	Status	Food
1	Red-wattled lapwing	<i>Vanellusindicus</i>	R	I,P,F
2	Cattle egret	<i>Bubulcus ibis</i>	RM	I,SI
3	Indian pond heron	<i>Ardeolagravii</i>	R	I,SI,SV
4	Common Myna	<i>Acridotherestrictis</i>	R	I,F
5	Burn swallow	<i>Hirundorustica</i>	R	I
6	Black drongo	<i>Dicrurusmacrocerus</i>	R	I
7	Asian open billed	<i>Anastomusocitans</i>	RM	I
8	Paddy field pippet	<i>Anthusrufulus</i>	R	I,P
9	Jungle myna	<i>Acridotheresfuscus</i>	R	I,F
10	White breasted waterhen	<i>Amaurornisphoenicurus</i>	R	I,SI,G,P
11	Shrike	<i>Laniustephronotus</i>	R	I
12	Stonechat	<i>Saxicolarubicola</i>	RM	I
13	White wagtail	<i>Motacilla alba</i>	RM	I,SI
14	Kingfisher	<i>Alcedoatthis</i>	R	I,SV
15	Great tit	<i>Parus major</i>	R	I
16	Hoopoe	<i>Upupaepops</i>	RM	I
17	Oriental magpie robin	<i>Copsychussaularis</i>	R	I
18	Lesser adjutant stork	<i>Leptoptilosjavanicus</i>	RM	I
19	AianPied Starling	<i>Sturnus contra</i>	R	I,F
20	Spotted dove	<i>Spilopeliachinensis</i>	R	G
21	Rose Ringed parakeet	<i>Psittaculakrameri</i>	R	F,P,G
22	Red vented Bulbul	<i>Pycnonotuscafer</i>	R	I,P,F
23	Scaly breasted Munia	<i>Lonchurapunctulata</i>	R	I,G
24	Baya weaver	<i>Ploceusphilippinus</i>	R	I,G
25	Eurasian Tree Sparrow	<i>Passer montanus</i>	R	G,I

Status: R-Resident, RM- Resident migrant, M-Migrant

Food Habit: I- Insectivorous; G –Granivorous; F- Fruits/ berries; P- Plants/aquatic vegetation/ nectar; SI – Small invertebrates; SV – Small vertebrates/fishes/mice/rat/small birds/eggs/reptiles; O – Omnivorous

V. COMMON BIRD SPECIES OF AAU-ZRS,NORTH LAKHIMPUR

BLACK DRONGO

Black drongo comes under the category of beneficial birds. It feeds on important agriculture pest hence considered as farmers friends. It hunts insect in air. This bird can be easily identified by its distinctive black colour and long forked tail. Its size varies from 30-35cm.



BAYA WEAVER

Baya weavers locally known as Tukura bird is a sparrow sized bird famous for building elaborate, hanging nests woven from leaves. They are depredatory birds feeding on seeds, rice etc. Their size varies from 15-17cm. The non-breeding males and females have brownish-streaked plumage. During breeding season males develop a bright yellow crown, a dark mask and a yellow breast.



BARN OWL

They are nocturnal, hunting at night primarily small rodents and also insects. They can be distinguished by heart-shaped facial disc, often pure white and white underparts with buff and gray mottling on the back and wings.



BULBUL

This dark, medium sized bird often seen in high trees or wires prefers to eat fruits, flower buds and insects. They have a black crest and a white rump with red colour under the tail which is difficult to be noticed.



ORIENTEL MAGPIE ROBIN

It is an insectivorous bird, famous for mimicking other birds sound. They are beautiful having black and white colour in case of male and grayish-brown plumage in case of female. Its diet primarily includes insects, worms and other small invertebrates.



HOUSE SPARROW

It is a small bird that has a typical length of about 15-17cm. Females and young birds are coloured pale brown and grey, and males have brighter black, white, and brown markings. Females usually are slightly smaller than males. They are opportunistic feeding insects and their larvae, caterpillar and many other natural foods.



BLUE ROCK PIGEON

They feed chiefly in cultivations, mainly on seeds also eats green shoots. Pale gray overall with two bold black wingbars and iridescent purple and green on neck. Feral varieties are common in cities and farmland, often in large flocks.



ROSE RINGED PARAKEET

They feeds on cereals, pulses, oilseeds, fruits and vegetables. Vibrantly bright green parakeet, frequently found in woodland, parks, and gardens. Nests in cavities, including holes in buildings. They are distinguishable with the very long slender tail and bright red bill.



CATTLE EGRET

It is an important insectivorous bird. This bird is having brown plumage with yellow colour beak and legs. Large white patch in wings conspicuous in flight. Its size varies between 25-27cm. They are also considered as farmers friend bird because they extensively feeds on agriculture insect pest.



VI. CONCLUSION

The present studies indicate that the rice-rice, rice-mustard, rice-maize support a wide variety of bird species. These habitats are utilized by different bird communities for nesting, feeding, roosting and other activities. The insectivorous and carnivorous species are considered to be useful to agriculture since they keep a very potent check on population of insect and rodent pests of crops.

Conservation of bird species will not only provide us ecosystem services but will also help in maintaining ecological balance. For sustainable agriculture efforts can be made in biological pest management using the natural predators of pests like birds and instead of chemical pesticides. Birds are another recently recognized addition to the list of biological pest control agent. When used in combination with other pest control treatments, birds may help reduce population of insects and small mammals. Erecting perches and artificial nesting structures for raptors and songbirds is an easy way to complement IPM efforts. Perches and nesting structures can be placed around the perimeter of crop fields or in nearby suitable habitat.

Investigation conducted since 2010 under AINP on Agri. Ornithology on Birds. Survey was conducted by following the existing trails with variable lengths. The study was also conducted in the wetlands and riverside areas. The observer walked along the designated trails at a pre-determined time. Opportunistic records were also incorporated in the checklist. For nomenclature and classification we have followed Manakadan and Pittie (2001). Only those species with confirmed identity are reported. The results were recorded as follows- **Total number of 18 orders, 57 families, 122 genus & 167 total species**

Table 10. Checklist of the Birds in Agricultural landscape of Assam

Order	Family	Common & Scientific name	
1.Podicipitiformes	1.Podicipitidae	1.Little grebe <i>Tachybaptusruficollis</i>	
2. Pelecaniformes	2.Phalacrocoracidae	2.Little Cormorant <i>Phalacrocoraxniger</i>	
		3.Great Cormorant <i>Phalacrocorax carbo</i>	
	3. Anhingidae	4.Oriental Darter <i>Anhinga melanogaster</i>	
	4. Ardeidae	5.Grey Heron <i>Ardeacinerea</i>	
3.Ciciniiformes		6.Yellow Bittern <i>Ixobrychussinensis</i>	
		7.Great Egret <i>Ardea alba</i>	
		8.Eastern Cattle Egret <i>Bubulcus ibis</i>	
		9.Intermediate Egret <i>Mesophoyx intermedia</i>	
		10.Little Egret <i>Gretta garzetta</i>	
		11.Indian Pond-Heron <i>Ardeolagrayii</i>	
		12.Striated Heron <i>Butoridesstriata</i>	
		13.Black-crowned Night-Heron <i>Nycticoraxnycticorax</i>	
		14.Cinnamon Bittern <i>Ixobrychuscinnamomeus BR,C</i>	
		15.Purple Heron <i>Ardeapurpurea</i>	
		5. Ciconiidae	16.Asian Openbill stork

		<i>Anastomusoscitans</i>
		17.Lesser Adjutant <i>Leptoptilosjavanicus</i>
		18.Greater Adjutant <i>Leptoptilosdubius</i>
		19.Asian Woolly-necked Stork <i>Ciconiaepiscopus</i>
	6.Threskiornithidae	20.Glossy Ibis <i>Plegadisfalcinellus</i>
4.Anseriformes	7. Anatidae	21.Greylag Goose <i>Anseranser</i>
		22.Ruddy Shelduck <i>Tadornaferruginea</i>
		23.Lesser Whistling-Duck <i>Dendrocygnajavanica</i>
		24.Gadwall <i>Anasstrepera</i>
5.Falconiformes	8. Accipitridae	25.Black-winged Kite (Black-shouldered Kite) <i>Elanuscaeruleus</i>
		26.Black Kite <i>Milvusmigrans</i>
		27.Pied Harrier <i>Circus melanoleucos</i>
		28.Long-legged Buzzard <i>Buteorufinus</i>
		29.White-rumped Vulture Gyps bengalensis
		30.Shikra <i>Accipiter badius</i>
	9. Pandionidae	31.Osprey <i>Pandion haliaetus</i>
6. Galliformes	10. Phasianidae	32.Swamp Francolin <i>Fracolinusgularis</i>
	11. Rallidae	33.White-breasted Waterhen <i>Amaurornisphoenicurus</i>
7. Gruciformes		34.Watercock <i>Gallicrexcinerea</i>
		35.Gray-headed Swamphen <i>PorphyrioporphyrioBR, C</i>
		36.Eurasian Coot <i>Fulicaatra</i>
	12. Jacanidae	37.Pheasant-tailed Jacana <i>Hydrophasianuschirurgus</i>
8.Charadriiformes		38.Bronze-winged Jacana <i>Metopidiusindicus</i>

	13.Charadriidae	39.Little Ringed Plover <i>Charadriusdubius</i>
		40.Red-wattled Lapwing <i>Vanellusindicus</i>
	14.Scolopacidae	41.Common Sandpiper <i>Actitishypoleucos</i>
	15. Rostratulidae	42.Greater Painted-snipe <i>Rostratulabenghalensis</i>
	16. Laridae	43.Whiskered Tern <i>Chlidoniashybrida</i>
		44.Yellow-footed Pigeon <i>Treronphoenicopterus</i>
		45.Eurasian Collared-Dove <i>Streptopeliadecaocto</i>
		46.Green Imperial-Pigeon <i>Duculaaenea</i>
	17.Columbidae	47.Asian Emerald Dove <i>Chalcophapsindica</i>
		48.Spotted Dove <i>Streptopeliachinensis</i>
		49.Red collared dove <i>Streptopeliatranquebarica</i>
9.Columbiformes		50.Oriental Turtle-Dove <i>Streptopeliaorientalis</i>
		51.Red-breasted Parakeet <i>Psittaculaalexandri</i>
10.Psittaciformes	18.Psittacidae	52.Rose-ringed Parakeet <i>Psittaculakrameri</i>
		53.Alexandrine Parakeet <i>Psittaculaeupatria</i>
		54.Asian Koel <i>Eudynamysscolopaceus</i>
11.Cuculiformes	19.Cuculidae	55.Green-billed Malkoha <i>Phaenicophaeustristis</i>
		56.Spotted Owlet <i>Athenebrama</i>
	20.Strigidae	57.Asian Barred Owlet <i>Glaucidiumcuculoides</i>
12.Strigiformes	21. Trogonidae	58.Red-headed Trogon <i>Harpacteserythrocephalus</i>
13. Apodiformes	22.Apodidae	59.Asian Palm-Swift <i>Cypsiurusbalasiensis</i>
		60.Pied Kingfisher <i>Cerylerudis</i>
14.Coraciiformes	23.Alcedinidae	61.Common Kingfisher

		<i>Alcedoatthis</i>
		62.White-throated Kingfisher <i>Halcyon smyrnensis</i>
		63.Stork-billed Kingfisher <i>Pelargopsis capensis</i>
	24.Meropidae	64.Asian Green Bee-eater <i>Merops orientalis</i>
		65.Chestnut-headed Bee-eater <i>Merops leschenaulti</i>
		66.Blue Tailed Bee Eater <i>Merops philippinus</i>
	25.Coraciidae	67.Indian Roller <i>Coracias benghalensis</i>
		68.Indian Roller, <i>Coracias benghalensis</i>
	26.Upupidae	69.Eurasian Hoopoe <i>Upupa epops</i>
15.Upupiformes	27.Bucerotidae	70.Oriental Pied-Hornbill <i>Anthracoceros albirostris</i>
16.Buceroformes	28.Megalaimidae	71.Blue-throated Barbet <i>Megalaima asiatica</i>
		72.Coppersmith Barbet <i>Megalaima haemacephala</i>
		73.Lineated Barbet <i>Megalaima lineata</i>
		74.Blue-eared Barbet <i>Megalaima australis</i>
		75.Great Barbet, <i>Megalaima virens</i>
	29.Picidae	76.Black-rumped Flameback <i>Dinopium benghalense</i>
		77.White-browed Piculet <i>Sasia ochracea</i>
	30.Alaudidae	78.Sand Lark, <i>Calandrella raytal</i>
		79.Oriental Skylark <i>Alauda gulgula</i>
17.Piciformes		80.Bengal Bushlark <i>Mirafra assamica</i>
18.Passeriformes	31.Hirundinidae	81.Barn Swallow <i>Hirundo rustica</i>

		82.Gray-backed Shrike, <i>Laniustephronotus</i>
	32.Laniidae	83.Long-tailed Shrike <i>Laniusschach</i>
		84.Brown Shrike <i>Laniuscristatus</i>
	33.Irenidae	85.Asian Fairy-bluebird <i>Irena puella</i>
	34. Monarchidae	86.Black-naped Monarch <i>Hypothymisazurea</i>
	35. Chloropseidae	87.Golden-fronted Leafbird <i>Chloropsisaurifrons</i>
	36. Cisticolidae	88.Zitting Cisticola <i>Cisticolajuncidis</i>
	37.Sylviidae	89.Striated Grassbird <i>Megaluruspalustris</i>
	38.Oriolidae	90.Black-hooded Oriole <i>Oriolusxanthornus</i>
		91.Crow-billed Drongo <i>Dicrurusannectans</i>
		92.Lesser Racket-tailed Drongo <i>Dicrurusremifer</i>
	39.Dicruridae	93.Ashy Drongo <i>Dicrurusleucophaeus</i>
		94.Hair-crested Drongo <i>Dicrurushottentottus</i>
		95.Greater Racket-tailed Drongo <i>Dicrurusparadiseus</i>
		96.Black Drongo <i>Dicrurusmacrocerus</i>
	40.Artamidae	97.Ashy Woodswallow <i>Artamusfuscus</i>
		98.Chestnut-tailed Starling <i>Sturniamalabarica</i>
		99.Indian Pied Starling <i>Gracupica contra</i>
	41.Sturnidae	100.Common Myna <i>Acridotherestrictis</i>
		101.Jungle Myna <i>Acridotheresfuscus</i>
		102.Indian Pied Starling <i>Gracupica contra</i>
		103.Great Myna <i>Acridotheresgrandis</i>
	42.Corvidae	104.Rufous Treepie <i>Dendrocittavagabunda</i>

		105. House Crow <i>Corvus splendens</i>
		106. Large Billed Crow <i>Corvus macrohynchos</i> BR, C
	43. Campephagidae	107. Large Cuckooshrike <i>Coracinamacei</i>
		108. Scarlet Minivet <i>Pericrocotus speciosus</i>
	44. Turdinae	109. Blue Whistling-Thrush <i>Myophonus caeruleus</i>
		110. Daurian Redstart <i>Phoenicurus aureus</i>
		111. Oriental Magpie-Robin <i>Copsychus saularis</i>
		112. Lesser Shortwing <i>Brachypteryx leucophrys</i>
		113. Common Stonechat (Siberian Stonechat) <i>Saxicola aurus</i>
	45. Paridae	114. Cinereous Tit <i>Parus cinereus</i>
	46. Pycnonotidae	115. Red-vented Bulbul <i>Pycnonotus cafer</i>
		116. Red-whiskered Bulbul <i>Pycnonotus jocosus</i>
		117. Black-crested Bulbul <i>Pycnonotus flaviventris</i>
		118. Eurasian Wryneck <i>Jynx torquilla</i>
		119. White-throated Bulbul <i>Alophoixus flaveolus</i>
		120. White-throated Fantail <i>Rhipidura albicollis</i>
		121. Common Tailorbird <i>Orthotomus sutorius</i>
		122. Dark-necked Tailorbird <i>Orthotomus atrogularis</i>
	47. Muscicapinae	123. Red breasted flycatcher, <i>Ficedula parva</i>
		124. Grey-headed Canary-Flycatcher <i>Culicicapaceylonensis</i>
		125. Small Niltava <i>Niltava macgrigoriae</i>
	48. Certhiidae	126. Paddyfield Pipit (Oriental Pipit) <i>Anthus rufulus</i>
	49. Motacillidae	127. White Wagtail <i>Motacilla alba</i>

		128.Scarlet-backed Flowerpecker <i>Dicaeumcruentatum</i>
		129.Fulvous-breasted Woodpecker <i>Dendrocoposmacei</i>
	50.Dicacidae	130.Gray-headed Woodpecker, <i>Picuscanus</i>
		131.Greater Yellownape <i>Picusflavinucha</i>
		132.Greater Flameback <i>Chrysocolaptesguttacristatus</i>
		133.Ruby-cheeked Sunbird <i>Chalcopariasingalensis</i>
	51.Nectariniidae	134.Little Spiderhunter <i>Arachnotheralongirostra</i>
		135.Indian White-eye (Oriental White-eye) <i>Zosterospalpebrosus</i>
		136.House Sparrow <i>Passer domesticus</i>
	52. Passerinae	137.Eurasian Tree Sparrow <i>Passer montanus</i>
		138.Baya Weaver <i>Ploceusphilippinus</i>
	53.Ploceidae	139.Black- breasted weaver <i>Ploceusbenghalensis</i>
		140.White-rumped Munia <i>Lonchurastriata</i>
		141.Chestnut Munia <i>Lonchuraatricapilla</i>
	54.Estrididae	142.Scaly-breasted Munia (Nutmeg Mannikin) <i>Lonchurapunctulata</i>
		143.Black- Headed Munia <i>Lonchura Malacca</i>
		144.Chestnut-eared Bunting <i>Emberizafucata</i>
		145.Little Bunting <i>Emberizapusilla W,C</i>
	55.Emberizidae	146.Yellow – Breasted Bunting <i>Emberiza aureola</i>
		147.Black- Faced Bunting <i>Emberizaspodocephala</i>
	56. Sylviinae	148.Aberrant Bush Warbler <i>Horornisflavolivaceus</i>

		149.Chestnut-crowned Bush Warbler <i>Cettia major</i>
		150.Blyth's Reed Warbler <i>Acrocephalus dumetorum</i>
		151.Dusky Warbler <i>Phylloscopus fuscatus</i>
		152.Yellow-browed Warbler <i>Phylloscopus inornatus</i>
		153.Yellow-vented Warbler <i>Phylloscopus cantator</i>
		154.Spotted Bush Warbler <i>Locustellathoracica</i>
		155.Smoky Warbler <i>Phylloscopus fulgiventis</i>
		156.Whistler's Warbler <i>Seicercus whistleri</i>
		157.Tickell's Leaf-Warbler <i>Phylloscopus affinis</i>
		158.Greenish Warbler <i>Phylloscopus trochiloides</i>
		159.Hume's Warbler <i>Cettiabrunnescens</i>
		160.Grey-sided Bush-Warbler <i>Cettiabrunnifrons</i>
		161.Grey-bellied Tesia <i>Tesiacyaniventer</i>
		162.Paddyfield Warbler <i>Acrocephalus agricola</i>
		163.Green-crowned Warbler (Golden-spectacled Warbler) <i>Seicercus burkii</i>
	57.Timaliinae	164.Abbott's Babbler <i>Turdinus abbotti</i>
		165.Jungle Babbler <i>Turdoides striata</i>
		166.Pygmy Wren-babbler (Pygmy Cupwing) <i>Pnoepygapusilla</i>
		167.Grey-throated Babbler <i>Stachyris nigriceps</i>



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