



# Birds in Agricultural Fields of Ayodhya District, Uttar Pradesh

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**Abstract:** Birds play a crucial role in functioning of the agro-ecosystems. It is important to understand the bird diversity of agricultural fields to develop a baseline for continuous monitoring of ecosystem changes in future. This study was carried out by plotting fixed radius point counts in the agricultural fields across Ayodhya district, Uttar Pradesh to determine the diversity and distribution of birds in agro-ecosystems of the study area. A total of 128 bird species belonging to 49 families and 15 orders were recorded from the study area. Passeriformes (71) had the maximum number of bird species. The highest number of species recorded were Omnivores (35%). Out of the 128 bird species recorded, six species were in the threatened category of IUCN Red List (2021) which highlights the conservation value of agricultural landscapes in Uttar Pradesh.

**Keywords:** Avian, Agro-ecosystems, Threatened, Conservation, Foraging guild, Feeding guild

Birds are an important constituent of the agro-ecosystems. Role of birds as seed dispensers, pollinators, scavengers and predators of insects, help in ecosystem functioning. They are known to be the best indicators of environmental changes (Kushwaha et al 2015). The agro-ecosystems in turn provide these birds with food in the form of grains, seeds, vegetables, grasses, weeds, insects, invertebrates and rodents (Asokan et al 2009). The insectivorous and carnivorous birds help in keeping the population of insect pests and rodents under control. Thus, benefitting the farmers by providing natural crop protection. Uttar Pradesh has 16.81 million ha of land under agriculture i.e. 70% (Anonymous 2021a) which makes it one of the most intensively cultivated state among other Indian states. But studies related to bird distribution in agricultural lands in Uttar Pradesh is limited. There are a few studies done by Sundar (2006, 2009), Sundar and Subramanya (2010), Sundar and Kittur (2012, 2013) on bird composition. But there are no studies done on bird diversity on agro-ecosystems in Ayodhya district of Uttar Pradesh. A checklist of birds distributed in agricultural habitat is needed so that a reliable baseline can be developed for monitoring changes in biodiversity and environment. So, there is an urgent need to document the bird diversity found in agro-ecosystems of Ayodhya district.

## MATERIAL AND METHODS

**Study site:** This study was conducted in the Ayodhya district of Uttar Pradesh which consists of five tehsils (Fig. 1). This

district lies between 26.7730 °N and 82.1458 °E and situated 93 m above MSL (Anonymous 2021b). The climate of the district is tropical monsoon. The average temperature varies from 32 °C in summers to 16 °C in winters and the average annual rainfall is 1067 mm (Anonymous 2021b). There are three distinct seasons – summer (March to June), rainy (July to October) and winter (November to February). The study area includes reserve forests, remnant vegetation patches, rivers, temple ponds, wetlands, gardens, paddy fields and human habitations.

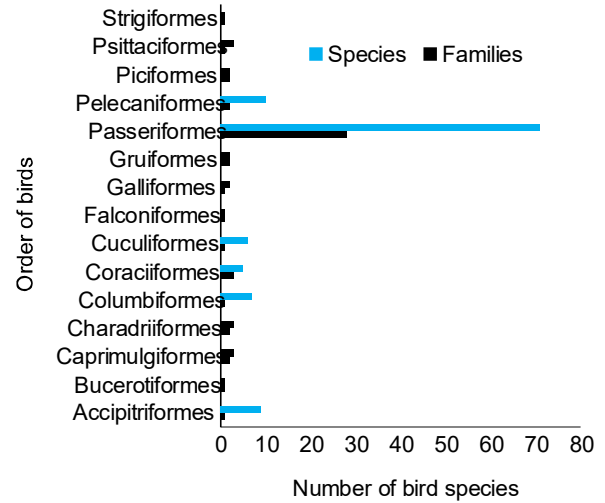
**Methodology:** The study was carried out from September 2020 to August 2021 with an aim to prepare a checklist of birds present in agricultural fields of Ayodhya district, Uttar Pradesh. Fixed radius, point counts (Bibby et al 2000) were placed at fixed sites distributed across the agricultural fields throughout the district. Surveys were conducted during 06:00 am to 09:00 am during summers and after disappearance of fog during winter mornings. At every point count species were recorded for 10 minutes. A pair of field binoculars (Nikon 7x35) was used to record species. The opportunistic sightings of birds during other time of day were also included. Photographs were taken wherever possible to aid in identification. Grimmett et al (2011) was used for bird identification. For every species observed, the data sheet was filled in to record the date, time, GPS location (Garmin GPS), species name, number of individuals, feeding habit and habitat. Every species recorded was assigned the taxonomic position, common and scientific names by referring to Praveen et al (2020). The assessment of threat

status of the recorded bird species was based on IUCN Red List (2021).

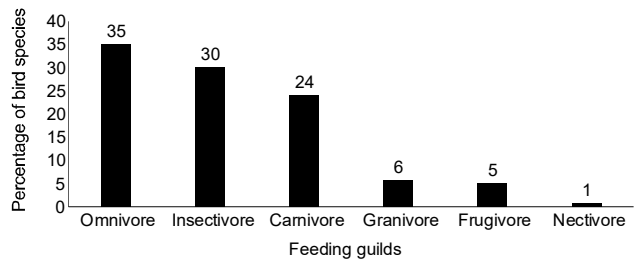
**RESULTS AND DISCUSSION**

A total of 128 bird species belonging to 49 families and 15 orders were recorded from the study area (Table 1). Similar studies in different paddy fields have reported 97 species in Maharashtra (Abdar 2014) and 144 species in West Bengal (Hossain and Aditya 2016). Passeriformes (71) had the maximum number of species, followed by Pelecaniformes (10) (Fig. 2). The order of Bucerotiformes, Falconiformes and Strigiformes (1 each) had the lowest number of species (Fig. 2). The order of Passeriformes (28) had the maximum number of families, followed by Coraciiformes. The family Accipitridae and Muscipidae (9 each) had the highest number of species, followed by Ardeidae and Columbidae (7 each) (Fig. 3). In India, Passeriformes are known to be the most dominant order (Praveen et al 2016) and Muscipidae is known to be the most diverse family (Manakadan and Pittie 2001). Out of 128 bird species recorded, 100 bird species (78%) were resident, 24 bird species (19) were winter visitors and only 4 bird species (3%) were summer visitors. Studies conducted by Hossain and Aditya (2016) in West Bengal have reported similar results. According to the feeding guilds, the 128 bird species recorded were classified into six foraging guilds. The maximum number of species were Omnivores (35%), followed by insectivores (30%) (Fig. 4). This result is not in accordance with the study conducted by Narayana et al (2019), where insectivores were dominant foraging guild in agro-ecosystems. According to the IUCN Red List (2021), out of the 128 bird species recorded, one species (0.78%) was 'Endangered', two species (1.56%) were 'Vulnerable', three

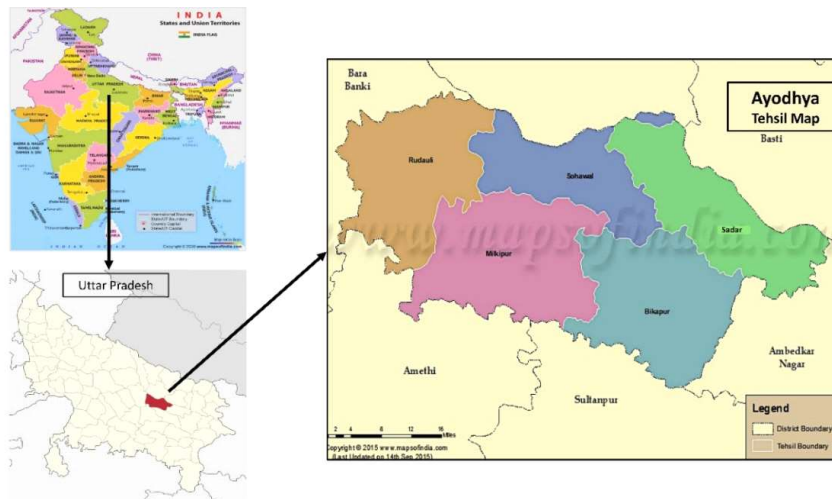
species (2.34%) were 'Near Threatened' and the rest 122 species (95.31%) were of 'Least Concern' (Table 1). This work thus, highlights the conservation value of agricultural landscapes in Uttar Pradesh.



**Fig. 2.** Order wise bird community composition in agricultural fields of study area



**Fig. 4.** Foraging guild-based classification of bird species in agricultural fields of study area



**Fig. 1.** Location map of study area

**Table 1.** Checklist of birds recorded in agricultural fields of study area

Order/Family/Common name	Scientific name	Residential status	Feeding status	IUCN status
Accipitriformes Accipitridae (9)				
Black Kite	<i>Milvus migrans</i> (Boddaert 1783)	R	C	LC
Black-winged Kite	<i>Elanus caeruleus</i> (Desfontaines 1789)	R	C	LC
Crested Serpent Eagle	<i>Spilornis cheela</i> (Latham 1790)	R	C	LC
Egyptian Vulture	<i>Neophron percnopterus</i> (Linnaeus 1758)	R	C	EN
Indian Spotted Eagle	<i>Clanga hastata</i> (Lesson 1831)	R	C	VU
Shikra	<i>Accipiter badius</i> (Gmelin 1788)	R	C	LC
Short-toed Snake Eagle	<i>Circaetus gallicus</i> (Gmelin 1788)	R	C	LC
Western Marsh-harrier	<i>Circus aeruginosus</i> (Linnaeus 1758)	WV	C	LC
White-eyed Buzzard	<i>Butastur teesa</i> (Franklin 1831)	R	C	LC
Bucerotiformes Bucerotidae (1)				
Indian Grey Hornbill	<i>Ocyrceros birostris</i> (Scopoli 1786)	R	O	LC
Caprimulgiformes Apodidae (2)				
Asian Palm Swift	<i>Cypsiurus balasiensis</i> (Gray 1829)	R	I	LC
Indian House Swift	<i>Apus affinis</i> (Gray 1830)	R	I	LC
Upupidae (1)				
Common Hoopoe	<i>Upupa epops</i> (Linnaeus 1758)	R	O	LC
Charadriiformes Charadriidae (2)				
Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert 1783)	R	O	LC
Yellow-wattled Lapwing	<i>Vanellus malabaricus</i> (Boddaert 1783)	R	C	LC
Glareolidae (1)				
Small Pratincole	<i>Glareola lactea</i> (Temminck 1820)	R	I	LC
Columbiformes Columbidae (7)				
Eurasian Collared Dove	<i>Streptopelia decaocto</i> (Frivaldszky 1838)	R	G	LC
Laughing Dove	<i>Streptopelia senegalensis</i> (Linnaeus 1766)	R	G	LC
Oriental Turtle Dove	<i>Streptopelia orientalis</i> (Latham 1790)	WV	G	LC
Red Collared Dove	<i>Streptopelia tranquebarica</i> (Hermann 1804)	R	G	LC
Rock Pigeon	<i>Columba livia</i> (Gmelin 1789)	R	G	LC
Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli 1786)	R	G	LC
Yellow-footed Green Pigeon	<i>Treron phoenicopterus</i> (Latham 1790)	R	F	LC
Coraciiformes Alcedinidae (2)				
Common Kingfisher	<i>Alcedo atthis</i> (Linnaeus 1758)	R	C	LC
White-throated Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus 1758)	R	C	LC
Coraciidae (1)				
Indian Roller	<i>Coracias benghalensis</i> (Linnaeus 1758)	R	C	LC
Meropidae (2)				
Blue-tailed Bee-eater	<i>Merops philippinus</i> (Linnaeus 1767)	SV	I	LC
Green Bee-eater	<i>Merops orientalis</i> (Latham 1801)	R	I	LC
Cuculiformes Cuculidae (6)				
Asian Koel	<i>Eudynamis scolopaceus</i> (Linnaeus 1758)	R	O	LC
Common Hawk Cuckoo	<i>Hierococcyx varius</i> (Vahl 1797)	R	O	LC
Greater Coucal	<i>Centropus sinensis</i> (Stephens 1815)	R	O	LC

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Order/Family/Common name	Scientific name	Residential status	Feeding status	IUCN status
Indian Cuckoo	<i>Cuculus micropterus</i> (Gould 1838)	SV	O	LC
Pied Cuckoo	<i>Clamator jacobinus</i> (Boddaert 1783)	SV	O	LC
Sirkeer Malkoha	<i>Taccocua leschenaultii</i> (Lesson 1830)	R	O	LC
Falconiformes Falconidae (1)				
Common Kestrel	<i>Falco tinnunculus</i> (Linnaeus 1758)	WV	C	LC
Galliformes Phasianidae (2)				
Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin 1789)	R	O	LC
Indian Peafowl	<i>Pavo cristatus</i> (Linnaeus 1758)	R	O	LC
Gruiformes Gruidae (1)				
Sarus Crane	<i>Antigone antigone</i> (Linnaeus 1758)	R	O	VU
Rallidae (1)				
White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant 1769)	R	O	LC
Passeriformes Acrocephalidae (2)				
Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i> (Blyth 1849)	WV	O	LC
Booted Warbler	<i>Iduna caligata</i> (Lichtenstein 1823)	WV	I	LC
Aegithinidae (1)				
Common Iora	<i>Aegithina tiphia</i> (Linnaeus 1758)	R	O	LC
Alaudidae (4)				
Ashy-crowned Sparrow-Lark	<i>Eremopterix griseus</i> (Scopoli 1786)	R	O	LC
Bengal Bushlark	<i>Mirafra assamica</i> (Horsfield 1840)	R	O	LC
Crested Lark	<i>Galerida cristata</i> (Linnaeus 1758)	R	O	LC
Sand Lark	<i>Alaudala raytal</i> (Blyth 1845)	R	O	LC
Campephagidae (3)				
Indian Cuckooshrike	<i>Coracina macei</i> (Lesson 1831)	R	I	LC
Long-tailed Minivet	<i>Pericrocotus ethologus</i> (Bangs & Phillips 1914)	WV	I	LC
Small Minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus 1766)	R	I	LC
Cisticolidae (4)				
Ashy Prinia	<i>Prinia socialis</i> (Sykes 1832)	R	I	LC
Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant 1769)	R	I	LC
Plain Prinia	<i>Prinia inornata</i> (Sykes 1832)	R	I	LC
Zitting Cisticola	<i>Cisticola juncidis</i> (Rafinesque 1810)	R	I	LC
Corvidae (3)				
House Crow	<i>Corvus splendens</i> (Vieillot 1817)	R	O	LC
Large-billed Crow	<i>Corvus macrorhynchos</i> (Wagler 1827)	R	O	LC
Rufous Treepie	<i>Dendrocitta vagabunda</i> (Latham 1790)	R	O	LC
Dicaeidae (1)				
Thick-billed Flowerpecker	<i>Dicaeum agile</i> (Tickell 1833)	R	O	LC
Dicruridae (1)				
Black Drongo	<i>Dicrurus macrocercus</i> (Vieillot 1817)	R	C	LC
Estrildidae (3)				
Indian Silverbill	<i>Euodice malabarica</i> (Linnaeus 1758)	R	G	LC
Red Munia	<i>Amandava amandava</i> (Linnaeus 1758)	R	O	LC
Scaly-breasted Munia	<i>Lonchura punctulata</i> (Linnaeus 1758)	R	O	LC

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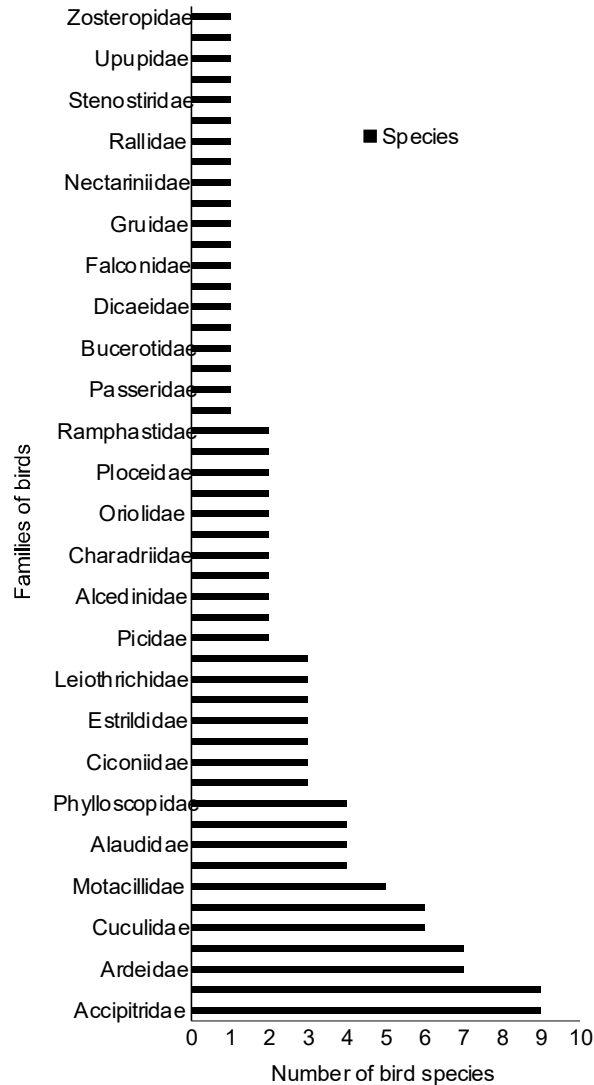
Order/Family/Common name	Scientific name	Residential status	Feeding status	IUCN status
Hirundinidae (4)				
Barn Swallow	<i>Hirundo rustica</i> (Linnaeus 1758)	WV	I	LC
Red-rumped Swallow	<i>Cecropis daurica</i> (Laxmann 1769)	R	I	LC
Streak-throated Swallow	<i>Petrochelidon fluvicola</i> (Vlyth 1855)	R	I	LC
Wire-tailed Swallow	<i>Hirundo smithii</i> (Leach 1818)	R	I	LC
Laniidae (3)				
Bay-backed Shrike	<i>Lanius vittatus</i> (Valenciennes 1826)	R	C	LC
Brown Shrike	<i>Lanius cristatus</i> (Linnaeus 1758)	WV	C	LC
Long-tailed Shrike	<i>Lanius schach</i> (Linnaeus 1758)	R	C	LC
Leiothrichidae (3)				
Common Babbler	<i>Argya caudata</i> (Dumont 1823)	R	O	LC
Jungle Babbler	<i>Argya striata</i> (Dumont 1823)	R	O	LC
Striated Babbler	<i>Turdoides earlei</i> (Blyth 1844)	R	O	LC
Monarchidae (1)				
Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus 1758)	SV	I	LC
Motacillidae (5)				
Citrine Wagtail	<i>Motacilla citreola</i> (Pallas 1776)	WV	I	LC
Grey Wagtail	<i>Motacilla cinerea</i> (Tunstall 1771)	WV	I	LC
Paddyfield Pipit	<i>Anthus rufulus</i> (Vieillot 1818)	R	C	LC
White Wagtail	<i>Motacilla alba</i> (Linnaeus 1758)	WV	I	LC
White-browed Wagtail	<i>Motacilla maderaspatensis</i> (Gmelin 1789)	R	I	LC
Muscicapidae (9)				
Black Redstart	<i>Phoenicurus ochruros</i> (Gmelin 1774)	WV	I	LC
Bluethroat	<i>Luscinia svecica</i> (Linnaeus 1758)	WV	I	LC
Brown Rockchat	<i>Oenanthe fusca</i> (Blyth 1851)	R	I	LC
Indian Robin	<i>Copsychus fulicatus</i> (Linnaeus 1766)	R	C	LC
Oriental Magpie Robin	<i>Copsychus saularis</i> (Linnaeus 1758)	R	C	LC
Pied Bushchat	<i>Saxicola caprata</i> (Linnaeus 1766)	R	I	LC
Siberian Stonechat	<i>Saxicola maurus</i> (Pallas 1773)	WV	I	LC
Taiga Flycatcher	<i>Ficedula albicilla</i> (Pallas 1811)	WV	I	LC
Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i> (Blyth 1843)	R	I	LC
Nectariniidae (1)				
Purple Sunbird	<i>Cinnyris asiaticus</i> (Latham 1790)	R	N	LC
Oriolidae (2)				
Black-hooded Oriole	<i>Oriolus xanthornus</i> (Linnaeus 1758)	R	O	LC
Indian Golden Oriole	<i>Oriolus kundoo</i> (Sykes 1832)	R	O	LC
Paridae (1)				
Cinereous Tit	<i>Parus cinereus</i> (Vieillot 1758)	R	I	LC
Passeridae (1)				
House Sparrow	<i>Passer domesticus</i> (Linnaeus 1758)	R	O	LC
Phylloscopidae (4)				
Blyth's Leaf Warbler	<i>Seicercus reguloides</i> (Blyth 1842)	WV	I	LC
Common Chiffchaff	<i>Phylloscopus collybita</i> (Vieillot 1817)	WV	I	LC
Greenish Leaf Warbler	<i>Seicercus trochiloides</i> (Sundevall 1837)	WV	I	LC
Hume's Leaf-warbler	<i>Abrornis humei</i> (Brooks 1878)	WV	I	LC

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Order/Family/Common name	Scientific name	Residential status	Feeding status	IUCN status
Ploceidae (2)				
Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus 1766)	R	O	LC
Black-breasted Weaver	<i>Ploceus benghalensis</i> (Linnaeus 1758)	R	O	LC
Pycnonotidae (2)				
Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus 1766)	R	O	LC
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i> (Linnaeus 1758)	R	O	LC
Sittidae (1)				
Chestnut-bellied Nuthatch	<i>Sitta castanea</i> (Lesson 1830)	R	O	LC
Stenostiridae (1)				
Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i> (Swainson 1820)	WV	I	LC
Sturnidae (6)				
Asian Pied Starling	<i>Gracupica contra</i> (Linnaeus 1758)	R	O	LC
Bank Myna	<i>Acridotheres ginginianus</i> (Latham 1790)	R	O	LC
Brahminy Starling	<i>Sturnia pagodarum</i> (Gmelin 1789)	R	O	LC
Common Myna	<i>Acridotheres tristis</i> (Linnaeus 1766)	R	O	LC
Common Starling	<i>Sturnus vulgaris</i> (Linnaeus 1758)	WV	O	LC
Jungle Myna	<i>Acridotheres fuscus</i> (Wagler 1827)	R	O	LC
Turdidae (1)				
Black-throated Thrush	<i>Turdus atrogularis</i> (Jarocki 1819)	WV	G	LC
Vangidae (1)				
Common Woodshrike	<i>Tephrodornis pondicerianus</i> (Gmelin 1789)	R	I	LC
Zosteropidae (1)				
Indian White-eye	<i>Zosterops palpebrosus</i> (Temminck 1824)	R	I	LC
Pelecaniformes Ardeidae (7)				
Black-crowned Night-heron	<i>Nycticorax nycticorax</i> (Linnaeus 1758)	R	O	LC
Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus 1758)	R	C	LC
Grey Heron	<i>Ardea cinerea</i> (Linnaeus 1758)	WV	C	LC
Indian Pond-heron	<i>Ardeola grayii</i> (Sykes 1832)	R	C	LC
Intermediate Egret	<i>Ardea intermedia</i> (Wagler 1827)	R	C	LC
Little Egret	<i>Egretta garzetta</i> (Linnaeus 1766)	R	C	LC
Purple Heron	<i>Ardea purpurea</i> (Linnaeus 1766)	R	C	LC
Ciconiidae (3)				
Asian Openbill	<i>Anastomus oscitans</i> (Boddaert 1783)	R	C	LC
Painted Stork	<i>Mycteria leucocephala</i> (Pennant 1769)	WV	C	NT
Woolly-neck Stork	<i>Ciconia episcopus</i> (Boddaert 1783)	R	C	NT
Piciformes				
Picidae (2)				
Black-rumped Flameback	<i>Dinopium benghalense</i> (Linnaeus 1758)	R	O	LC
Brown-capped Pygmy Woodpecker	<i>Dendrocopos moluccensis</i> (Gmelin 1788)	R	I	LC
Piciformes Ramphastidae (2)				
Brown-headed Barbet	<i>Psilopogon zeylanicus</i> (Gmelin 1788)	R	F	LC
Coppersmith Barbet	<i>Psilopogon haemacephalus</i> (Muller 1776)	R	F	LC
Psittaciformes Psittaculidae (3)				
Alexandrine Parakeet	<i>Psittacula eupatria</i> (Linnaeus 1766)	R	F	NT
Plum-headed Parakeet	<i>Psittacula cyanocephala</i> (Linnaeus 1766)	R	F	LC
Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli 1769)	R	F	LC
Strigiformes Strigidae (1)				
Spotted Owlet	<i>Athene brama</i> (Temminck 1821)	R	C	LC

IUCN: International Union for Conservation of Nature and Natural Resources; R: Resident, WV: Winter Visitor, SV: Summer Visitor; C: Carnivorous; O: Omnivorous; I: Insectivorous; F: Frugivorous; G: Granivorous; N: Nectarivore; LC: Least Concern; EN: Endangered; VU: Vulnerable; NT: Near Threatened



**Fig. 3.** Family wise bird community composition in agricultural fields of study area

**CONCLUSION**

This study provides the baseline information on bird species associated with the agricultural fields in the Ayodhya district of Uttar Pradesh. The results obtained from this research highlights that the agricultural landscapes support highly threatened species and therefore plays an important role in conservation of bird species outside protected areas.

The results obtained from this research can be taken up by the policy makers and local environmental NGO's for further strengthening conservation measures in Uttar Pradesh.

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