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Study on diversity and temporal distribution of avifauna in paddy field during Kharif season of Janjgir- Champa District

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Abstract: *Paddy fields are a man made semi-aquatic ecosystem maintained for the purpose of cultivating rice crop. This important crop is highly infested by insect pests. Use of bio-control agents in paddy field is considered as one of the alternatives to overcome the hazardous effect of chemical pesticides for the control of insect pests. Birds are one of these highly motivated, efficient and cost-effective bio-control agents. As enemies of insects, birds stand secondary consumer strata of paddy field ecosystem. A survey on paddy field birds was conducted during kharif season of paddy in Janjgir- champa district during 2013-2014 . During the study period 42 bird species were found and identified belonging to 25 families and 8 order in paddy fields. Out of these, 05 were omnivorous, 09 were insectivorous, 03 were granivorous, 04 were insectivorous plus granivorous, 17 were insectivorous as well as carnivorous (eat vertebrate prey), and 01 were nectarivorous 03 were purely carnivorous. 36 bird species are categorized to be beneficial. 04 birds species are considered to be highly beneficial i.e. Black Drongo (Dicrurus macrocercus) destroying injurious insects like stem-borer, skippers and leaf rollers in enormous numbers in the rice ecosystem, Small green Bee-eater(Merops orientalis), Little Egret (Egretta garzetta) and White-Bbreasted Kingfisher (Halcyon smyrnensis). Three granivorous birds cause damage to crop.*

Key words*: paddy field, pesticides, bio-control agent, insectivorous , carnivorous*

I. Introduction

Paddy fields are a man made semi-aquatic ecosystem maintained for the purpose of cultivating rice crop. A single cultivation cycle lasts for 4-6 months depending on the rice variety planted, during this period paddy field go by an aquatic, semi aquatic and a terrestrial stage. Thus, they provide heterogeneous habitat and hence are inhabited by a variety of insects so it provides a concentrated and highly predictable source of food for birds. birds are heterogeneous in their feeding habit (Ali & Ripley, 1987), the available fauna viz., crabs snails, worms, insect larvae & pupae inhabiting the paddy fields logged with water may constitute their food. So Birds are the key species in an agricultural ecosystem for maintaining the ecological balance (Haslem and Bennett, 2008).

In any ecosystem population of birds reveals the environmental quality of the area, pollution level and availability of food. Their positive and negative roles in agriculture production were very well illustrated (Ali, 1949 and 1971).There food in general is of three kinds: (i)Plant and crop product like grain, seeds and fruits, (ii) green vegetation of the crop plants and grasses, and (ii)Animal- insects, other arthropods, rodents, etc., found in the soil, crops and other plants (O'Connor and Shrubb, 1986). That's why their contribution to balance ecosystem cannot be underestimated.

II. Objective

Objective of present study is to list the birds community of paddy field, To identify insectivorous birds in the paddy field and find out their role as a bio-control agent & to investigate the occurrence of granivorous birds in the field.

III. Study Area and Methodology

The Janjgir-Champa district is situated in the center of Chhattisgarh with a Longitude 21.6 degree to 22.4 degree towards north and Latitude 82.3 degree to 83.2 degree towards east and so it is considered as Heart of Chhattisgarh (Figure no.1). The Janjgir-Champa district is a major producer of rice in the Chhattisgarh state. The Hasdeo-bango project has been considered as life supporting canal for the district Janjgir-Champa.

An observation on paddy field birds was conducted during kharif season of paddy. Three different areas (paddy fields) were selected in Navagarh block of Janjgir - champa district during 2013-14. Birds

observation were made from 6am to 10am. Observations were recorded during whole cropping period for different stage of paddy crop viz ploughing(wet), puddling (wet), nursery (Inundated), transplantation (inundated), tillering (inundated), milky stage (inundated), seed maturation stage (wet), harvesting (Dry) and after harvested (Dry) stage. binocular and canon camera was used for observing birds in the field and to record it. The line transect method was followed to count the birds species (Bibby *et al*., 1998). Transect of two kms was walked in selected paddy fields between 6 am to 10 am to record birds species weekly. List of Birds and their feeding nature observed and recorded during study period. Species richness in each cropping stage was recorded and Abundance of all species in four categories was noted as follows-

- More than 25 -Very common (VC)
- 11 to 25 - Common(C)
- 2 to 10 - Not rare(NR)
- 0 to 1 - Rare(R)

Fig 1

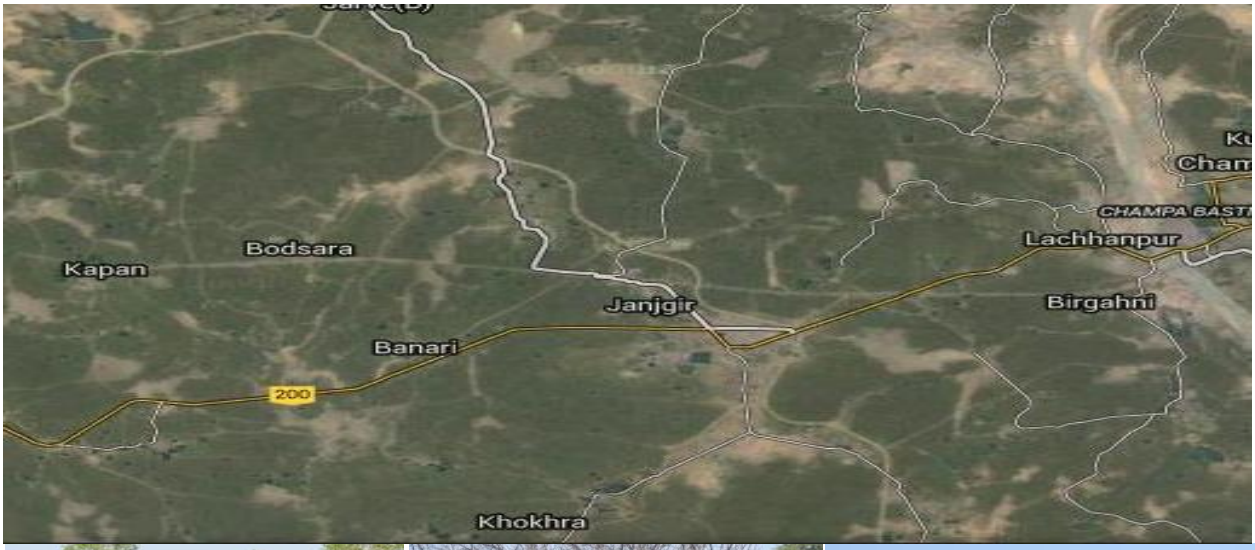

Fig 2

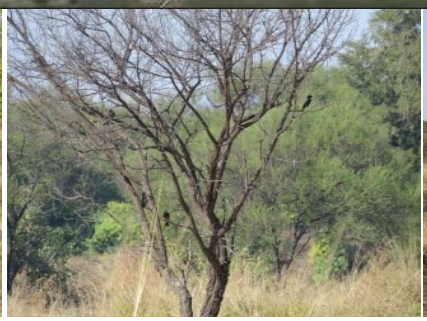

Fig 3

Fig 4

IV. Results and Discussion

During the study period 42 bird species were found and identified belonging to 25 families and 8 order in paddy fields, out of which 18 species belonged to Passeriformes and 7 species belonged to Ciciniformes, 5 species of Coraciformes, 4 species belonged to Cuculiformes, 3 species belonged to Charadiformes and 2 species each of collumbiformes & Falconiformes, and Strigiformes was represented by single species. (Fig 4

Feeding behavior of these birds was noted, book of Indian birds by Salim ali (2002) was also consulted for feeding nature. Based on feeding nature, these birds were grouped in seven categories. Number of birds falling in each category are , 07 were omnivorous, 09 were insectivorous (eat only insects prey) , 03 were granivorous, 04 were granivorous and insectivorous, 17 were insectivorous as well as carnivorous(eat vertebrate prey) , 03 were purely carnivorous and 01 was nectarivorous (Fig 5). A systematic list along with their species richness and abundance is presented in Table No.1.

Temporal distribution of birds in different phonological stages of paddy is shown in table 1. During the ploughing stage the richness was 24 and cattle egret was very common, and black Drongo, Pied Myna Paddy Field Pipit, Small Green Bee- eater were very common in the field. These birds pick up abundant amount of insects, larvae, from the ground. During the puddling stage the richness was 17 and Cattle Egret was a commonly found bird during this phonological stage . During nursery stage species richness was 20 and Cattle Egret and Paddy Field Pipit were the common birds. During transplantation species richness was 26 and commonly seen birds during this stage were Cattle Egret, Llittle Egret, Red- Wattled Lapwing, Paddy Field Pipit. Tillering stage has 28 bird species while Cattle Egret, Llittle Egret, Red- Wattled Lapwing, Paddy Field Pipit, Pond Heron, White Breasted Kingfisher and Drongo were the commonly seen birds. During milk weed stage species richness was 26. Baya and White Throated Munia were very common birds around paddy fields, while Cattle Egret, Red Wattled Lapwing, Drongo, Little Brown Dove, Scley Munia and Red Munia were common in this stage of paddy. In seed maturation stage species richness was35, Baya and White-Throated Munia, Scley Munia and Red Munia were seen in large numbers, while Cattle Egret, Red- Wattled Lapwing, Drongo, Little Brown Dove, Paddy Field Warbler and Ashy- Crowned Sparrow Lark were common. During crop harvesting 31 bird species were noted among them Cattle Egret, Little Egret, and Myna were very common , Green Bee Eater, Pied Myna, White Throated Munia, Crested Lark, Ashy Crown Lark, Rufous Tailed Finch Lark were commonly seen birds at this phonological stage. During After harvest period 31 bird species were found, Cattle Egret and Pied Myna were found in numbers. Crested Lark, Paddy Field Pipit, Little Brown Dove were common.

Result shows, 11 birds species were found in all 9 cropping stages of paddy from ploughing till after harvesting. Cattle egret was found in flocks of 25-30 in fields. At ploughing, it congregates to catch the jumping insects disturbed by activity. During ploughing and puddling insectivorous birds were seen commonly. After that when the fields were inundated with water insectivorous and carnivorous birds were commonly seen. During seed maturation, harvest and post harvest stages granivorous birds were also found in fields. We found definite variation in temporal distribution of birds influenced by crop stage and field conditions (dry, wet, inundated).

Cattle Egret , Little Egret , Small Bee Eater , Black Drongo , Indian Pond Heron , Common Maina , Pied Main , Indian Roller , Common Sand Piper , Paddy Field Warbler these are the main insectivorous birds found in big number in paddy field . Past studies also have suggested that rice fields provided suitable habitat for foraging, breeding activities and shelter for various kind of birds (Takahashi & Ohkawara 2007; Wood et al. 2010). These birds play crucial role in managing pests in paddy field. The birds with small population have less significance as insect predators; however it needs special consideration for conservation. In corroboration with present study Paliwal and Bhandarkar (2014) also suggested need of conservation for birds found in small population. Bushes and trees within and around paddy field provide nesting and rusting sites for many birds, many areal insectivorous and carnivorous birds perch on these vegetations in search of prey. Basavarajappa (2006) has mentioned that native flora might have extended comfortable shelter & foraging ground for water birds.

In present study six migratory birds were seen in paddy fields. Of these Asian open-Bill Stork, Black Ibis, Black-wing Stilt, Wire-tailed Swallow were local migratory while Common sandpiper was winter visitor and Pied Crested Cuckoo was rain visitor

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V. Conclusion

Paddy fields are self sustained agro-ecosystem, Supporting various invertebrates and vertebrates of heterogeneous feeding habit. Insect pest cause great economic loss to the farmers of this region. Insectivorous birds can help to cut the cost of production by devouring large number of pests.

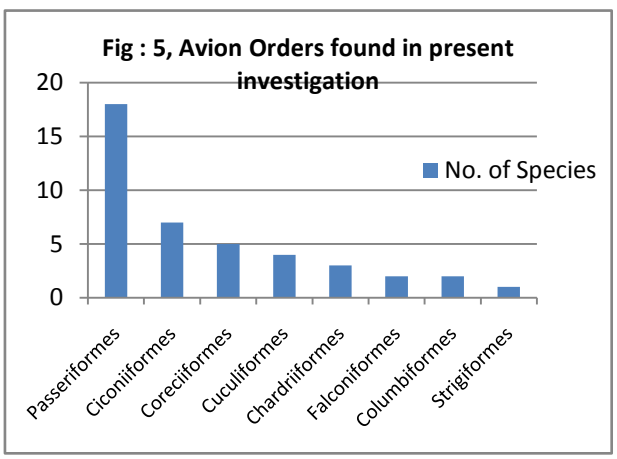
Table 1: Checklist of birds found during different stage of Paddy Growth, During 2013-14

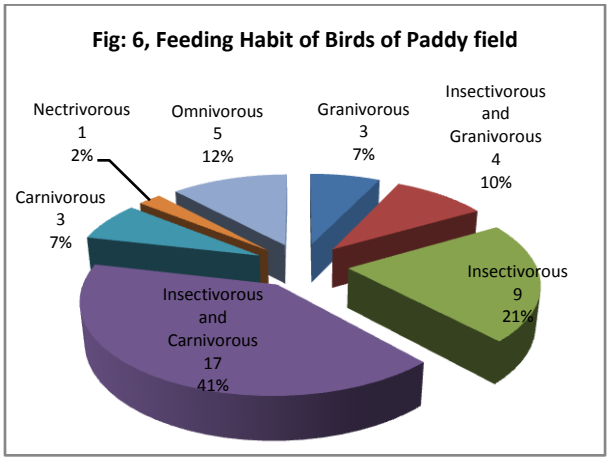
S. N.	ORDER	FAMILY	SPECIES	GENERIC NAME	I	II	III	IV	V	VI	VII	VIII	IX	FEEDING NATURE
1	**Coraciiformes**	Coraciidae	Indian rollar	*Coracias benghalensis*	NR	A	R	R	NR	A	A	NR	NR	In + Ca
		Alcedinidae	Lesser Pied kingfisher	*Ceryle rudis*	A	A	R	A	R	A	A	A	A	In + Ca
			White- Brested	*Halcyon smyrnensis*	N	N	R	N	C	A	A	A	N	In + Ca

			Kingfisher		R	R		R				R		
		Meropidae	Small Green Bee-Eater	*Merops orientalis*	C	NR	NR	NR	NR	A	A	C	C	In
		Upupidae	Common Hoopoes	*Upupa epops*	R	A	A	A	A	A	A	A	R	In + Ca
2	**Ciconiiformes**	Ardeidae	Indian Pond- Heron	*Ardeola grayii*	NR	NR	NR	NR	C	NR	NR	A	A	In + Ca
			Cattle Egret	*Bubulcus ibis*	VC	C	C	C	C	NR	C	VC	VC	In + Ca
			Little Egret	*Egretta garzetta*	VC	C	NR	C	C	C	C	VC	C	In + Ca
			Median Egret	*Mesophoyx intermedia*	A	A	A	R	R	A	A	A	A	In + Ca
			Chestnut Bittern	*Ixobrychu scinamomeus*	A	A	A	A	R	R	A	A	A	In + Ca
		Ciconidae	Asian Open-Billed Stork	*Anastomus oscitans*	NR	NR	NR	NR	NR	NR	NR	A	NR	In + Ca
		threskiornithidae	Black Ibis	*Pseudibis papillosa*	A	A	A	NR	A	A	A	A	A	In + Ca
3	**Charadriiformes**	Charadriidae	Red- Wattled Lapwing	*Vanellus indicus*	A	A	NR	C	C	C	C	R	NR	In + Ca (inverebrate)
			Common Sandpiper	*Actitis hypoleucos linnaeus*	A	R	R	NR	NR	A	A	A	A	In
		Recurvirostridae	Black- Winged Stilt	*Himantopus himantopus*	A	R	NR	NR	NR	A	A	A	A	In + Ca (inverebrate)
4	**Falconiformes**	Accipitridae	Pariha Kite	*Milvus migranus*	NR	A	A	A	A	A	A	A	NR	Ca
			Sikra	*Accipiter badius*	R	A	A	A	A	A	A	R	NR	Ca
5	**Passeriformes**	Dicruridae	Black Drongo	*Dicrurus macrocercus*	C	NR	R	NR	C	C	C	NR	NR	In
		Muscicapidae	Oriental Magpie - Robin	*Copsychus saularis*	A	A	A	A	A	R	NR	R	NR	In
			Indian Robin	*Saxicoloides fulicata*	A	A	A	A	A	R	NR	R	NR	In
			Common Babbler	*Turdoides caudatum*	A	A	A	A	NR	NR	NR	NR	NR	Om
			Paddy- Field Warbler	*Acrocephalus agricola*	A	A	R	R	NR	NR	NR	NR	NR	In
		Sturnidae	Commonmyna	*Acridotheres tristis*	C	A	A	A	A	A	A	VC	VC	Om
			Pied Myna	*Sturnus contra*	C	R	A	A	A	A	A	C	VC	Om
		Ploceidae	Baya Weaver	*Ploceus philippinus*	A	A	A	A	A	VC	VC	NR	A	Om
			White-Tthroated Munia	*Lonchura malabarica*	A	A	A	A	A	VC	VC	C	A	Gr
			Scaly Munia	*Lonchura punctulata*	R	R	R	R	R	C	VC	C	NR	Gr
			Red Munia	*Amandava amandava*	R	R	R	R	R	C	VC	C	NR	Gr
		Alaudidae	Sykes -Crested lark	*Galerida deva*	C	N	N	N	N	N	N	C	C	In

						R	R	R	R	R	R			
			Ashy -Crown Sparrow Lark	*Eremopterix grisea*	A	A	A	A	A	A	C	C	NR	In + Gr
			Rufous-Tailed Finch Lark	*Ammomanes phoenicurus*	A	A	A	A	A	A	C	C	C	In + Gr
		Motacillidae	Paddy- Field Pipit	*Anthus rufunus*	NR	NR	C	C	C	C	C	C	C	In
		Pycnonotidae	Red-Vented Bulbul	*Pycnonotus cafer*	NR	NR	NR	NR	NR	NR	NR	NR	NR	Om
		Hirundinidae	Wire-Tailed Swallow	*Hirundo smithii*	A	A	A	A	R	R	NR	NR	NR	In
		Nectariniidae	Purple SuNbird	*Nectarinia asiatica*	NR	NR	NR	NR	NR	NR	NR	NR	NR	Ne
6	**Strigiformes**	Strigidae	Spotted Owlet	*Athene brama*	R	NR	NR	R	NR	NR	A	R	NR	Ca
7	**Columbiformes**	Columbidae	Little Brown dove	*Streptopelia senegalensis*	R	A	A	A	A	C	C	NR	C	In + gr
			Spotted Dove	*Streptopelia chinensis*	R	A	A	A	A	A	A	A	R	In + gr
8	**Cuculiformes**	Cuculidae	Indian Cuckoo	*Cuculus micropterus*	R	A	A	A	A	A	R	R	R	In (catterpillar) + Ca
			Pied- Crested Cuckoo	*Clamator jacobinus*	A	A	A	NR	NR	NR	A	A	R	In + Ca
			Brainfever Bird	*Hierococcyx varius*	A	A	A	A	A	A	R	R	R	In (catterpillar) + Ca
		Centropodidae	Greater Coucal	*Centropus sinensis*	R	R	R	R	R	R	R	R	R	In + Ca

Stages of Paddy crop: I: Ploughing; II: Puddling; III: Nursery; IV: Transplantation Stage; V: Tillering Stage; VI: Milky Stage; VII: Seed Maturation Stage; VIII: Harvesting Stage; IX: After Harvested. Om- Omnivorous ,In- Insectivorous ,Ca- Carnivorous, Gr- Granivorous, Ne- Nectarivorous



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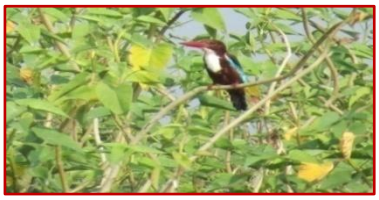
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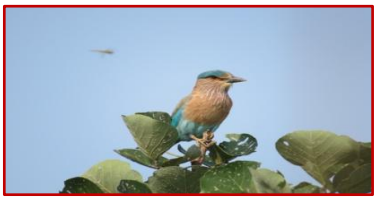
Figure No.9


Figure No.10


Figure No.11


Figure No.12


Figure No. 13


Figure No.14


Figure no.15


Figure No.16


Figure No.17


Figure No. 18

Figure No. 1, Study area
Figure No. 2, 4 Ploughing of field
Figure No. 3, Drongo during ploughing
Figure No. 7 *Merops orientals (*SMALL GREEN BEE- EATER)
Figure No. 8 *Halcyon smyrnensis (*WHITE- BREASTED KINGFISHER)
Figure No. 9 *Coracias benghalensis (* INDIAN ROLLER)
Figure No.10 *Bubulcus ibis* (CATTLE EGRET)
Figure No .11 *Anastomus oscitans(* OPEN BILL STORK)
Figure No. 12 *Pseudibis papillossa (*BLACK IBIS)
Figure No. 13 *Dicrurus macrocercus (* BLACK DRONGO)
Figure No. 14 *Acridotheres tristis(* COMMON MAINA)
Figure No. 15 *Sturnus contra(* PIED MAINA)
Figure No. 16 *Acrocephalus agricola* (PADDY FIELD WARBLER)
Figure No. 17 *Anthus rufulus (*PADDY FIELD PIPIT)
Figure No. 18 *Streptopilia Senegalensis (*LITTLE BROWN DOVE)

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