The Journal of Animal & Plant Sciences, 25(3 Supp. 2) 2015 Special Issue Page: 410-415
ISSN: 1018-7081

ON HABITAT OF PHEASANT TAILED JACANA, *HYDROPHASIANUS CHIRURGUS* IN PUNJAB PAKISTAN

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ABSTRACT

Pheasant Tailed Jacana, *Hydrophasianuschirurgus*is a beautiful bird which has maintained its presence in abandoned wetlands of Punjab during summer. This study was designed to associate the population levels of Pheasant Tailed Jacana with the biotic factors in its habitat like algae, protozoan, Rotifers, Cladocerans, and Copepods in plankton. Studies were recorded to find their optimal range of this species.Water samples were collected in a bottle directly or by using a pump to sample nana-planktons. In the phytosociological studies on distribution and frequency of rooted plant species were recorded to understand their association with the species. A total of 31 species were distributed in four vegetation types from jacana habitat.

Key Words: Phytoplanktons, Zooplanktons, Biotic factors, Pheasant Tailed Jacana, Pakistan

INTRODUCTION

Pheasant Tailed Jacana, *Hydrophasianusc hirurgus,*is adapted to habitat conditions of shallow slow moving or almost stagnant, permanent freshwater water bodies, holding rooted vegetation having floating broad leaves. Such habitat is generally very productive, providing food for man and his livestock, and supporting breeding of wintering and summer migrating birds. No specific study is in hand on the habitat requirements of the Pheasant Tailed Jacana, except for notes on its biology appearing in different text book (Roberts, 1991). The specific objective of the present study is to associate population levels of Pheasant Tailed Jacana, with physic-biotic factors of its habitat available under the conditions of the Punjab (Pakistan).

MATERIALS AND METHODS

Study Area: The Punjab (27.56 –34.00 N^o 69.36 – 75.22 E°) is the north eastern province of Pakistan spread over 205,344 km^2. Climatically, the province is a sub-tropical country(winter November - January, spring February - April, summer May - June, Monsoon July - August, and autumn September – October),with lowest temperatures are experienced in January (12 to 15°C) and the highest in June (46- 51°C). The average temperatures are lower in the northern latitudes, compared to southern parts of the province. The precipitation ranges between 15 mm and 315 mm in different parts, mainly contributed by summer monsoons (July-August),floods have been a regular feature, which support rice crop in the areas around rivers.

The present study concentrated on lakes i.e., Head Marala32.4^o NL, 74.31 ^{o} E, altitude 250 m above sea level, asl, on the river Chenab, pond area ,620 ha 0.2 - 5.0 m deep. Head Qadirabad: (32.19 ^{o} N, 73.39 ^{o} E altitude 225 m asl pond area 2850 ha, 0.2 - 5.0 m deep). Head Balloki (31.13 N^o, 73.52^o E altitude 184 masl, 1620 ha. 0.1 - 3.0 m deep), and Head Sulemanki (29.49 ^{o} NL, 72.33^o E, 177masl pond area during summers around 1620 ha, 3 -6.0 m deep.

Biotic factors: For the qualitative study of plankton, the surface, column, and bottom water samples were collected in 100 ml polythene bottles from different locations on the monthly basis using Kemmerer's sampler. Samples were fixed in 4% formalin, and transferred to laboratory (Fisheries Training Institute, Manawan, Lahore, Pakistan), or Commercial Fish Farm, University of Agriculture, Faisalabad, Pakistan.

The water samples were filtered through the sieve, (mesh size of 38 µm). The biomass left on the sieve was collected after different washes with distilled water and, after measuring the volume, was transferred to a vials which was preserved by adding (1 -3drops of formalin).

A known volume of thoroughly mixed sample material was placed in "Sedgwick Rafter Cell", and observed under the light microscope (600X, Lietz) following standard procedure (APHA, 1992). The number of cells falling in randomly selected microscopic fields of 50 grids was counted. Average of 5 to 10 counts for each sample were used for developing their relative frequencies and expressed as number of organisms/liter. The qualitative and quantitative estimation of zoo-phyto-planktons were determined using New bar Hemocytometer following Bauer (1990).

For nanoplanktons, micropipettes were used for making 1/20 dilutions. The members of cells were counted under the compound microscope (Olympus, CO II) standardized as the number of cells per liter,(area of 16 chambers was 9 mm^2). When the density of nanoplanktons was low the counting was carried out in four large chambers (1x 1mm) and each chamber was further subdivided into 16 small squares having a total area of $4mm^2$ as calculated by following formula.

$$\text{Nanoplankton/ } mm^2 = \frac{\text{Cell counted in 4 large squares}}{\text{Area counted x height of the chamber}}$$

Counting was carried out in central large square if density was very low. Each has an area of 0.4 mm^2(total of above small squares 0.2 mm^2 area). Quantitative estimation was carried as:

$$\text{Calculation} = \frac{\text{Cell counted in 5 squares}}{\text{Area counted x height of the chamber}}$$

The planktons were identified following Baur (1990) and APHA (1992).

The relative frequency of the different species of the rooted plants present in a pond was visually estimated in the field following (Braun-Blanquet, 1965) and assigned to one of the density class (1=<20%, 2=21-40%, 3=41-60%, 4=61-80%). The plant species were identified following Flora of Pakistan (Ali, 1982).

RESULTS

Biotic Factors:

Planktons

Algae: The algal biota was represented by four families, i.e., Chlorophyceae, Cyanophyceae, Bacillorphyacae and Euglenophycae. Marala was especially rich in the algal biota, where members of all the four families appeared in significantly high frequencies as compared with the other localities (Table 1). The count at all the other localities remained at a significantly lower level (<200,000/L) showing very minor fluctuations. At Marala, there was a prominent summer boom of all the algal groups, rising steeply between April and May and a decline in winters (December).

Table 1: Plant species prevalence in habitat of Pheasant tailed Jacana at four study sites

	Marala				Qadirabad				Balloki				Sulemanki			
PondsSpecies	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**	**I**	**II**	**III**	**IV**
Typhaangusteta	4	-	1	-	2	4	1	-	-	1	-	-	1	-	3	-
Arundonax	3	-	1	3	3	2	4	-	1	2	-	-	-	2	4	1
Lotus corniculatus	2	4	1	-	4	3	3	4	3	-	3	-	4	3	1	4
Naru	1	1	1	1	-	1	-	1	1	1	1	1	1	-	-	1
Cyperus	1	2	-	1	1	-	-	1	2	1	2	-	3	1	2	3
Hydrillaverticilata	1	-	3	-	1	1	-	1	-	-	1	-	1	1	1	-
Vallisnaria	1	-	-	-	1	-	-	-	-	-	1	-	1	-	-	-
Panicum	-	3	-	1	1	1	-	-	-	-	-	3	2	-	-	-
Eishornia	-	1	-	2	-	-	-	-	4	3	-	2	-	4	-	1
Nymphaea alba	-	1	1	-	-	-	1	2	-	-	4	-	-	-	-	1
Chara	-	-	4	-	1	1	-	-	-	-	-	-	-	1	1	-
Akson	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-
Pistiastriotes	-	-	-	4	-	-	-	-	1	4	-	-	-	1	-	2
Phragmiteskarka	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-
Tripholium	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-
Triticumindica	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Typha alaphanttana	-	-	-	-	-	-	3	2	1	1	-	-	1	1	-	-
Saccharumspontanium	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-
Trapa	-	-	-	-	-	-	-	-	-	-	-	4	-	-	1	-
Oryzastiva	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Saccharummunja	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-

Prevalence: 1. Very High 2. High 3.Moderate 4. Low

Protozoa: The mixed population of the protozoans (Figure 1) maintained a count of 500 and 1500/ L, during different parts of the year, with very minor fluctuations. The population of the protozoa at all locations increased between April and June, which gradually dropped down in July. The July level of population was maintained for the rest of the year, with a bloom appearing at Qadirabad in January-February and a higher population at Ballokiduring April. The protozoan populations were

relatively lower at Marala, while population levels of other three localities were not different.

Rotifers: The population levels of rotifers during different parts of the year at the four study sites have been summarized in Figure 1.The population of Rotifers was significantly higher at Qadirabad and Sulemanki (which were not significantly different from one another at 0.05 level), followed by Balloki. The populations at Marala remained at the lowest level in all the seasonal samples. The population of the group was generally higher during April – June at all the localities, with a decline in the subsequent months, until January when the population levels showing rise (figure-1).

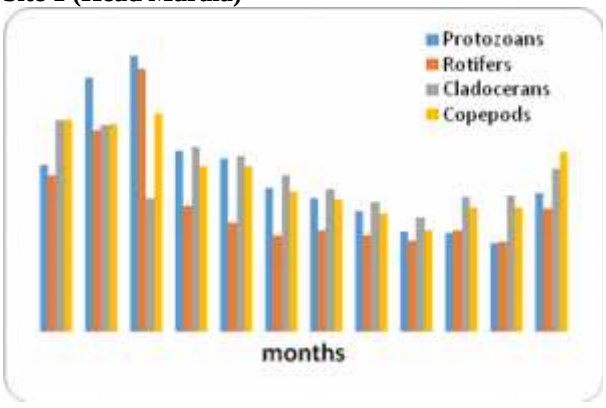
Cladocerans: The population levels of cladocerans remained low at Marala (500 – 1,000 /L), while medium population levels were recorded for Balloki (1,000 – 1,500/L)except for May when it showed a sharp increase 4,500/L**,** while relatively higher levels of populations were exhibited at Qadirabad and Balloki (1,500 – 2100/L). The cladoceran population exhibited some degree of seasonal fluctuation, generally a higher population found during January – May and lower populations in July – December Such a pattern appeared at all the localities with some degree of variation.

Copepods: The copepod populations at the different sites exhibited a similar pattern of fluctuations, with higher levels during January- February and June, followed by lower populations in the later half of the year. The population levels were significantly ($p<0.05$) high at Marala, while higher populations were exhibited at other three study sites, which were not significantly different from one another (Figure 1).

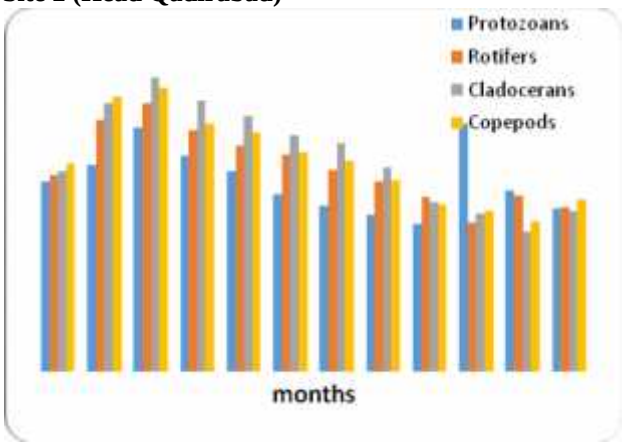
Rooted Vegetation: A total of 32 species of rooted plant species were identified from the four water bodies, holding appreciable populations of the Pheasant-tailed Jacana. These species are distributed at different depth of water or in the immediate vicinity of such water bodies. Each pond had a different vegetative composition, depending upon its physico-biotic conditions (Table 1). The species having floating leave represented by four species, i.e., *Nelumbomicifera, N. alba, Nymphaea lotus* and *Trapabispinosa*, which were associated with five other species, i.e., *Eichhorniacrasipes, Hydrillaverticillata, Vallisnariaspiralis, Psitia stratiotes* and *Chara* sp., which provided a thick floating mat in the water. Every pond had one or more of these species, appearing in different combinations. The species, like, *Arundodonax, Typhaaugustata, Panicumpaludorsum* and *Phragmiteskarka* were present in shallow waters in the peripheral area, which the other species were present in the areas surrounding the ponds, but associated with the water bodies.

Figure 1: Mean Zoo and Phyto plankton during April 2003 to March 2007
Zooplankton

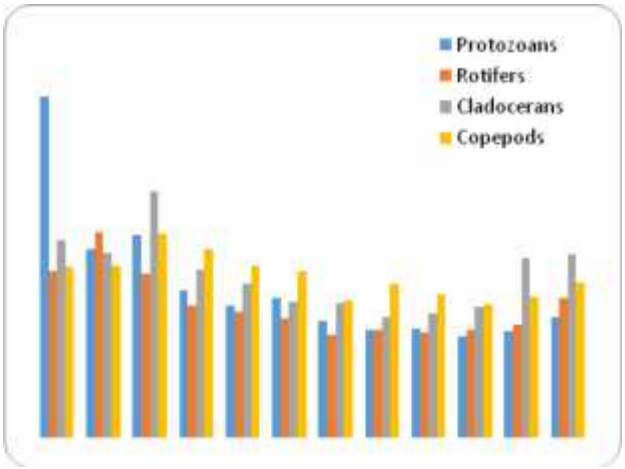
Site 1 (Head Marala)



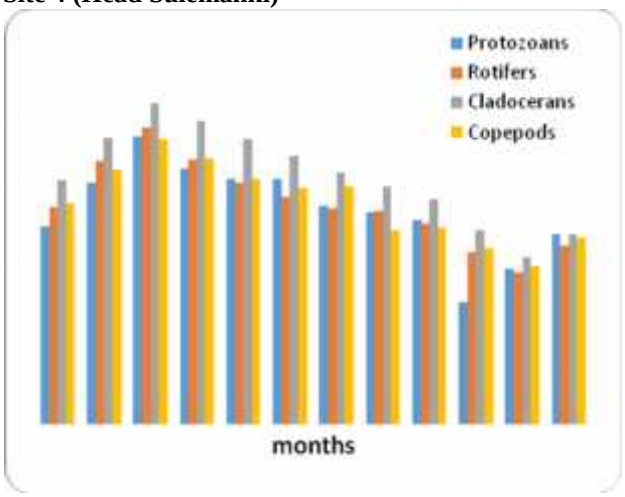
Site 2 (Head Qadirabad)



Site 3 (Head Balloki)

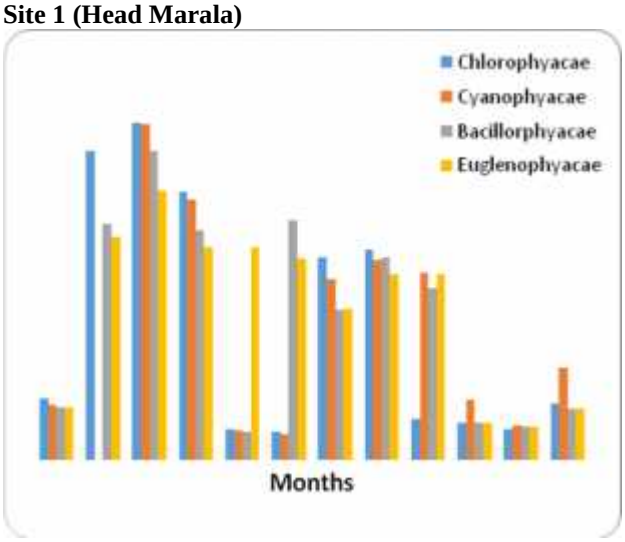


Site 4 (Head Sulemanki)

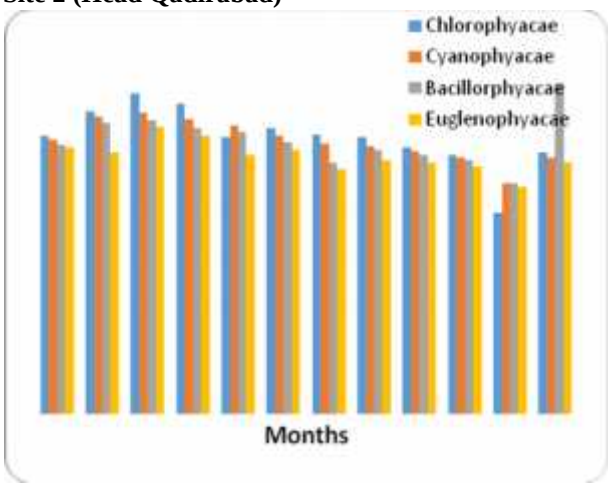


Months
Phytoplankton

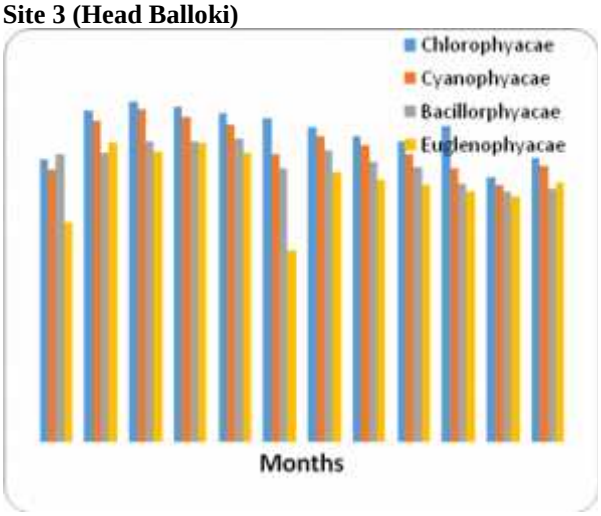
Site 1 (Head Marala)



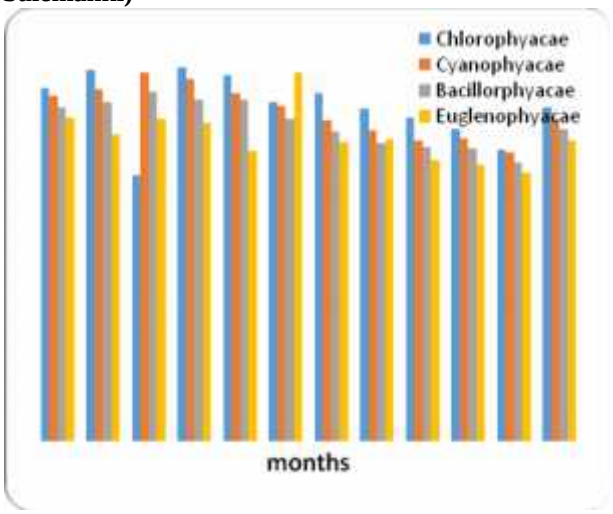
Site 2 (Head Qadirabad)



Site 3 (Head Balloki)



Site 4 (Head Sulemanki)



DISCUSSION

The analysis of the present distribution of the Pheasant-tailed Jacana largely go in conformity with the general observations appearing in literature that this bird species prefers the ponds having rooted vegetation with surface floating stems/leaves (Grizmek, 1972; Rao, 1991, Roberts, 1991; Butchart, 1998, Hassan, 2001; Kazmerczak *et al*., 2006, Khan and Mughal, 2014 and 2015). Changes with the pattern of flood appearing in the rivers to support paddy cultivation and development of established ponds associated with the man-made lakes around the barrages, it appears that the bird has gradually moved to these ponds for breeding, rather than remaining in more human disturbed paddy fields.

There are reports available suggesting a control of physico-biotic factors of the ponds with population level of jacana populations (Beecher, 1942; Edward,

1962). A number of reports have appeared on the levels or variation in the physico-biotic habitat parameters (Haramis*et al.*, 1986; Sampath and Krishnamoorthy, 1990; Khatri, 1985, Ormerod and Tyler, 1993; Ali *et al.*, 1988; Kushlan, 1989; Breininger and Smith, 1990; Ntiamoa and Baidu,1998; Weller, 1975; Tamisier and Grillas, 1994; Kumar, 1995; Mehra, 1986; Hutchinson, 1957; Latif, 1973; Vasishat and Jindal, 1980; Benzie, 1984; Bursey, 1989; Greenberg, 1964; Emmanuel and Onyemma, 2007; Waran *et al*., 2004; Chughtai, 1979; Baqai and Rehana, 1973; Saleem, 1986, Mahaulpatha, 2007) of the freshwater bodies in different parts of the work, but specific study on the jacana of Pheasant-tailed Jacana habitat is available. The present study concerns with the direct analysis of the physico-climatic and biotic factors of the ponds holding appreciable populations of the Pheasant-tailed Jacana. These analyses suggest that the temperature of air/water ranges between 16 and 35 ^{o}C. The pH remains slightly basic, while all other physico-chemical parameters remained within the limits of a freshwater water body. There was non-significant difference between different water bodies, with some degree of seasonal variations. As the variations between all such parameters were not significant, therefore association of such factors with the population levels of the Pheasant-tailed Jacana could not be attempted. It appears that these factors constantly remain within certain limits, which are fully adapted by the species and hence are frequently not working as limiting factors to control jacana populations.

The variation in the overall populations of phytoplanktons (algae) or zooplanktons protozoa, rotifers, cladocerans, copepods) was not different between different ponds holding this species of the birds, and there was not much marked seasonal variation in their populations during the summers, the breeding period of Pheasant-tailed Jacana in the area. The importance of the planktons in controlling the population of this pheasant species could not be determined under the present study. No previous study is available suggested a correlation of such factors with jacana populations. The present study did not did not attempt a microanalysis of species distribution or fluctuation in the water bodies, which could had provided some useful association with the jacana population levels.

The analysis of the rooted vegetation suggests that there were a total of 23 species of the rooted plants (angiosperm and fern) present along the periphery of the ponds holding jacana population. These species were present in different combinations and provided the protection, but were not directly important in the controlling the jacana population. One or of the four species of angiosperm rooted plants with their surfacing floating leaves (*Nelumbomicifera, N. alba, Nymphaea lotus* and *Trapabisoinosa*) and five species of the plants species floating just under the surface water (*Eishhorniacrasipes, Hydrillverticilata, Vallisnariaspiralis, Psitiastratiotes, Chara* spp.) were present in the water bodies holding the jacana populations. These species are mainly required for the breeding activities and nests are placed on the surface of the leaves of these species, where there are protected from the predators coming from terrestrial environment. No quantitative study was attempted on the relative distribution which could be used in the development of association with the jacana population levels. The species, like, *Eishorniacrassipes, Salviniamolesta, Imperata cylindrical* and *Mikania* sp. were indirectly associated with the presence of the jacana species (Malaulpatha, 2007).

The jacana appears to have adopted to survive in the open body of water rather than finding camouflage in the denser tall rooted vegetation present in the periphery of the pond. The general field observations suggest that the bird perfectly matches with the environment, and with its bright contrasting colour, it matches with the background vegetation giving a look of a flower emerging from the surface of the plant. The still bird hardly visible to a raptor, and remain out of the approach of the carnivores. The diving habit of the adult bird and chicks at the time of emergency is an additional defense of the bird.

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