

# Ecology of Bronze-winged Jacana and Pheasant-tailed Jacana within Makhana field habitat

*Euryale ferox* Salisb, known as Gorgon or prickly waterlily is locally called Makhana in India. It is a floating macrophyte that grows in wetland ecosystems, especially in marshy and muddy wetland habitats (Cronquist 1981). The characteristic feature of this species is its leaves which are large and take a long time to grow completely. Makhana with its large leaf provides an ideal habitat for two species of long-legged waterbirds, Bronze-winged Jacana *Metopidius indicus* and Pheasant-tailed Jacana *Hydrophasianus chirurgus*. These birds have distinguished morphological characters such as a long tail (long arching plumes) and legs with elongated toes and claws.

The geographical distribution of these two species is around the world's tropical and subtropical wetlands (Whittingham et al. 2000). Both belong to the monotypic genera (genera that contain only one species) (Whittingham et al. 2000). The IUCN Red List has classified the Bronze-winged Jacana as Near Threatened and the Pheasant-tailed Jacana as Least Concern.

Jacanas are polyandrous (females mate with more than one male) and also exhibit sex-role reversal—male jacana is likely to build nest, incubate and take care of the chicks (Eens & Pinxten 2000). With this background and

knowledge a study was conducted on these two species specifically looking at their diet and nesting. The study was conducted in different experimental Makhana cultivation plots in the Indian state of Bihar.

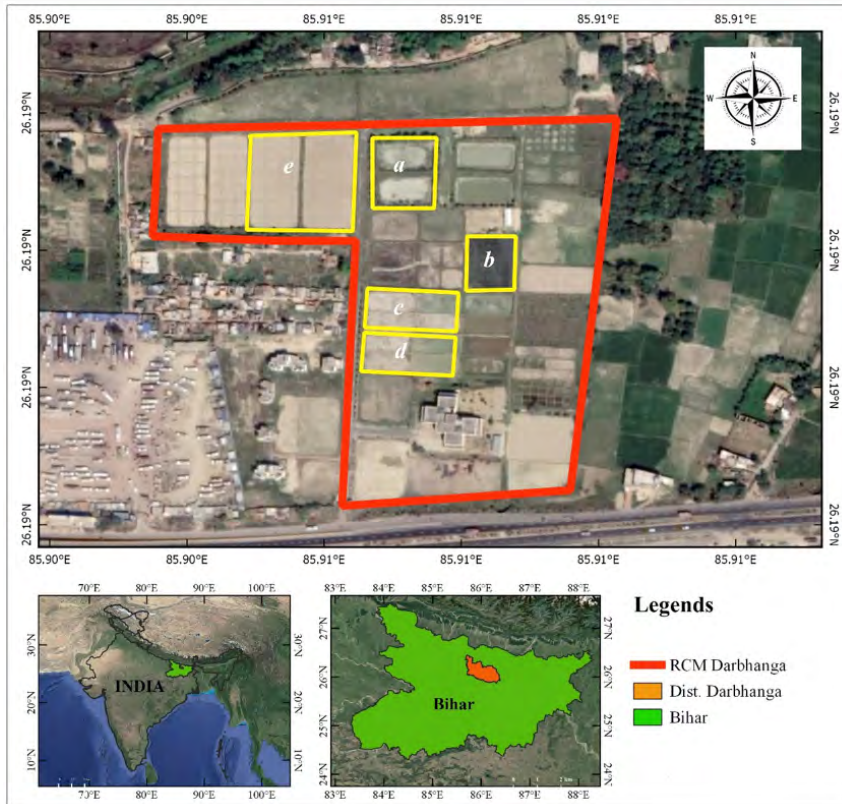
The results of this study will help in the management and conservation of these two aquatic species.

## Materials and methods

**Study area:** The experimental Makhana field at Research Center for Makhana (RCM) is located at 26.189°N & 85.905°E. It lies in Darbhanga District of Bihar, India (Image 1).

The observations of the birds was based primarily on the field work conducted during May–October 2019. In the experimental Makhana field, Makhana was cultivated under two different systems according to their water depth, viz., pond system method/PSM (1–2 m depth, area 1,600m<sup>2</sup>) and field system method/FSM (0.3m depth, 6,400m<sup>2</sup>) (Image 1a,c, 2a,c).

Birds were observed from 05.00–07.00 h and 14.00–15.00 h, and identified using Bushnell binoculars (20x50) and a field guide (Grimmet et al. 2016). The Makhana leaves were collected from the habitat for examining living matter. The samples were stored in



**Image 1. Experiment Makhana cultivation field at RCM Darbhanga, Bihar, India: a—pond system method of Makhana cultivation | b—water chestnut nursery | c—field system method of Makhana cultivation | d—lotus cultivation farm | e—rice field.**

a formaldehyde solution (4%), and examined using a 10X–40X microscope.

It was noted that the Bronze-winged Jacana's preferred habitat was field system method (FSM) and Water Chestnut *Trapa bispinosa* Roxb. nursery field with a large area. The Pheasant-tailed Jacana preferred a small area within the pond system. This could possibly be due to its long tail and legs which are better suited

for walking on the floating leaves. Both the species were feeding alone and were not competing while foraging.

During the month of May (when the Makhana seedlings are very small), and post growth period in the month of June, Pheasant-tailed Jacana were reported in Makhana pond system.

Both the species laid their eggs in the first week of July among the newly emerged

Makhana leaves in Makhana Pond system method (PSM). Each clutch had three eggs of pale yellow color with black spots, and the size may vary between 25mm and 30mm. The chicks hatched out in the last week of July with a 100% success rate. The protection provided to the eggs and chicks by the bowl-shaped Makhana leaves with thorns that protected the nest might be the reason for the birds breeding in this habitat (Fig 3d). The male Pheasant-tailed Jacana (smaller in size) was observed nursing the chicks, and often sent out noisy alarm calls when they thought predators were within the vicinity of the nests. It was also observed that male jacana held their chicks in wing coverts following the alarm call (Jenni 1974; Emlen & Oring 1977). Females of both the species were usually absent or very rarely seen in the Makhana field. They were observed in near-by rice fields and water chestnut fields during the incubation period (Image 1e,b). They might be spending more time in foraging rather than care for the nest. This finding supports Chen et al. (2008),

who reported that male Pheasant-tailed Jacanas take on parental duties and females scarcely provide the care.

In August, chicks of both Bronze-winged Jacana (Image 2e) and Pheasant-tailed Jacana (Image 2b) exhibited well-developed morphological character such as beak, coverts, rump, and long legs with fine toes in the Makhana field.

## Food and feeding habits

The birds were regularly observed foraging for food above and beneath the leaves, always seeking marginal parts of mature leaves.

Different food matter were collected from the young to fully mature floating leaves and also from other marginal weeds. Insect larvae (N=12) mollusks/gastropods (N=4), and periphyton were recorded in the collected leaves (Table 1). The usual diet of these two species consists of vegetable matter, seeds, roots, insects, and mollusks (Wang et al. 1998). According to the



**Image 2. Habitat of Jacana birds: a—pond system method of Makhana cultivation | b—Pheasant-tailed Jacana with chicks in pond system methods | c—field system method of Makhana cultivation | d—Makhana bowl shaped young leaves | e—Bronze-winged Jacana with chicks in field system methods | f—Bronze-winged Jacana on Makhana leaves. © Shailendra M. Raut.**

observations in the breeding habitat and availability of plant seeds (mostly water lily), these were also fed upon by the jacanas (Wang et al. 1998).

The present monsoon season observation (of more invertebrate diet) in the Makhana field could be because of the increased availability of these food items.

## Conclusion

Wetland ecosystems in North Bihar support commercially important macrophytes like Makhana and water chestnut, and contribute to the livelihood and food security of local poor fishermen communities (Chaudhary & Prakash 2003). The mollusks are attached mainly to the lower parts of leaves and other parts of the plants to utilize the nutrients for their



Table 1. Insects and mollusks collected from Makhana leaves.

	Insect species	Common name
1.	<i>Paracymus vulgatus</i> Woold.	Water scavenger beetle
2.	<i>Regimbartia attenuata</i> Fab.	Water scavenger beetle
3.	<i>Paederus melampus</i> Erichson.	Rove beetle
4.	<i>Carpelimus siamensis</i> Fauvel.	Rove beetle
5.	<i>Aeoloderma trachmana</i> Candeze.	Chick beetles
6.	<i>Menochilus</i> sp.	Lady bird beetle
7.	<i>Coccinella</i> sp.	Lady bird beetle
8.	<i>Bagous</i> sp.	Weevils
9.	<i>Nepa</i> sp.	Nepa
10.	<i>Atractomorpha</i> sp.	Walking sticks
11.	<i>Elophila crisonalis</i> W.	Caseworms/larvae, leaf roller
12.	<i>Galerucella birmnica</i> J.	Singhara beetle
<b>Mollusks/Gastropods</b>		
13.	<i>Lymnaea luteola</i> Lamarck	Freshwater snail
14.	<i>Gyraulus convexusculus</i> Hutton	Freshwater snail
15.	<i>Bellamya bengalensis</i> Lamarck	Freshwater snail
16.	<i>Gabbia orcula</i> Nevill	Freshwater snail

own growth. These insects are usually found in Makhana fields during the monsoon season, and their presence coincides with the breeding season of Jacanas. These species of birds along with others (e.g., herons, egrets, and lapwings) feed on these mollusks and provide protection to the plants, and benefit in turn. Given the importance of these two species of birds, it is critical to focus on strategies for their long term protection and conservation. Such an approach will benefit both

the birds as well as secure the livelihoods of people. Similar observations also need to be carried out with other species, to understand the applicability of such symbiotic relationships providing multiple benefits at the grassroot level.

#### References

- Chaudhary, J.N. & O. Prakash (2003).** Economic analysis of production and marketing of Makhana in Bihar. ICAR.
- Chen, T.C., Y.S. Lin & T.S. Ding (2008).** Time Budget of Polyandrous Pheasant-Tailed Jacana (*Hydrophasianus chirurgus*) during Breeding Season in Taiwan". *Taiwania* 53(2): 107–115.

**Cronquist, A. (1981).** *An Integrated System of Classification of Flowering Plants*. Columbia University Press, New York, 111.

**Eens, M. & R. Pinxten (2000).** Sex-role reversal in vertebrates: behavioural and endocrinological accounts. *Behavioural Processes* 51(1–3): 135–147.

**Emlen, S.T. & L.W. Oring (1977).** Ecology, sexual selection and the evolution of mating system. *Science* 197: 215–223.

**Grimmet, R., C. Inskipp & T. Inskipp (2016).** *Birds of Indian Subcontinent 2nd edition*. Oxford University Press, Delhi, 144pp.

**Jenni, D.A. (1974).** Evolution of polyandry in birds. *American Zoologist* 14(1): 129–144.

**Wang, J.P., Y.T. Ueng & J.J. Perng (1998).** Water quality, aquatic plankton and insects in the habitat of *Hydrophasianus chirurgus*. *Essays of the 4th Conference on Coastal Wetlands Ecology and Conservation* 1998: 8–23.

**Whittingham, L.A., F.H. Sheldon & S.T. Emlen (2000).** Molecular phylogeny of jacanas and its implications for morphologic and biogeographic evolution. *The Auk* 117(1): 22–32.

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