

Studies on Use of Local Medicinal Flora in Nest Building by Threatened Bird, *Grus antigone antigone* in and around Alwara Lake of District Kaushambi (U.P.), India

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Authors' contributions

This work was carried out in collaboration with both the authors without any dispute. Both authors SP and AKV designed the study, wrote the protocol and first draft of the manuscript. Author AKV managed the literature searches, analyses of the study performed the spectroscopy analysis and author SP managed the experimental process and identified the species of plant. Both the authors read and approved the final manuscript.

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ABSTRACT

An attempt was made to study the use of local medicinal flora in nest building by Indian Sarus Crane in and around Alwara lake of Kaushambi district of Uttar Pradesh. The study was centralized mainly on medicinal values of nesting materials used by sarus cranes to build their nests. The study and exploration were undertaken during two breeding seasons from June 2014–July 2015. A total of twenty one plant species belonging to 11 families having some medicinal values were identified to be used by the cranes in constructing their nests. The nests were found on large wetlands, paddy fields, scattered irrigation ditches, adjoining areas of Lake etc. around the human settlements, which were dominated by these plants.

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1. INTRODUCTION

The sarus crane belongs to family: Gruidae, order: Gruiformes, class: Aves and phylum: Chordata. There are three subspecies of sarus cranes, the Indian sarus crane *Grus antigone antigone*, Eastern sarus crane *Grus antigone sharpii* and the Australian sarus crane *Grus antigone gilli*. [1] gave the first comparative review of these three subspecies.

The Indian Sarus Crane *Grus antigone antigone* [2] is the world's tallest flying bird [3] and is the only resident breeding crane in India [4]. It is the world's biggest flying water bird and is declared as State Bird by the Government of Uttar Pradesh for its conservation. It is well known as an eternal symbol of unconditional love, devotion and good fortune and its occurrence in abundance represents a healthy wetland ecosystem.

The Indian sarus crane has been listed as a globally threatened i.e. vulnerable avian species [5] because of its declining numbers. Main reasons behind this decline are deterioration of natural habitat and increased anthropogenic activities for urbanization as well as for industrial expansion.

A few investigators [6-16] have tried to study the demography, ecology and status of Indian sarus crane on large scale in Uttar Pradesh. Sundar et al. [17] gave literature review of sarus crane in detail. As far as the study of this sarus crane in and around the Alwara lake is concerned, it is done only by few Zoologists [11-12,18,14-16]. A limnological, zooplanktonic, phytoplanktonic and ichthyologic study of the said lake was done by some researchers [19-25]. Very limited studies have been done so far on the nesting materials [26], their medicinal values and suitable selection of nesting sites from conservation point of view.

In the present investigation, the authors tried to throw some light on the medicinal values of plant materials used by cranes in nest construction and their effects on the safety of the eggs and juveniles in and around Alwara lake, explored during two breeding seasons from June 2014– July 2015.

1.1 Study Area

The lake under exploration i.e. Alwara lake is located in Sarsawan block of tahsil Manjhanpur

district Kaushambi of Uttar Pradesh (Image 1). The Alwara lake is a natural lake and now an important perennial wetland, as shown in Photograph 1. It is situated between the latitude 25°24'05.84"S – 25°25'10.63"N and longitude 81°11'39.49"E-81°12'57.95"W with altitude MSL – 81.08 meter.

The study area was divided into following three major transects based on its vastness, diversity and habitat of sarus crane: (i) Paur Kashi Rampur, (ii) Tikara and (iii) Shahpur.

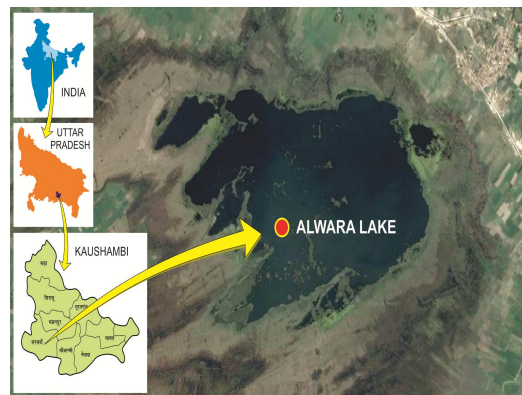


Image 1. The location of the study area



Photograph 1. A view of the study area of Alwara lake

2. MATERIALS AND METHODS

The sarus crane is a huge bird, mostly live in pairs (Photograph 2) and visible from a distance hence authors locate them nicely and almost accurately without facing any major problem. The team surveyed the greater part of the lake during the breeding season. Exploration route was decided on the basis of lake map ensuring

maximum coverage (approx. 90%) of each transect travelling a minimum distance of 2-3 km. The cranes were cited while moving on foot, sailing through chappu boat and driving the vehicle at a very low speed. The cranes, their nests (Photograph 3) and eggs were recorded and photographed by using binocular and zoom camera.

Identification and localization of crane nests were documented by direct visiting, tracing the crane pair and local enquires. Authors collected the used nesting materials and identified most of them with the help of local people. Identification and medicinal values of collected plant materials from nests were done with the help of [27-32].



Photograph 2. Paired crane (eternal symbol of unconditional love and devotion) ready to perpare nest

3. RESULTS AND DISCUSSION

Nesting behaviour, size and materials contributed show peculiarities and conservational values of the birds. Majority of the nests were fabricated with twigs, stems and roots of aquatic floating plants which were round in shapes, larger and floating type.

The nests were seen on large wetlands, paddy fields, scattered irrigation ditches, adjoining areas of lake, village ponds etc around the human settlements. The selection of nesting site and nesting materials largely depends upon the vegetation around the nests. Both male and female cranes build their nests, in both wetlands and uplands and breed during wet season in their range. A secluded spot in the territory is chosen and the cranes unison-call there, then walk away from the selected place and throw nesting materials lightly over their shoulders towards it. Returning to the nest site, they pull into the nest material which is within

reach, then slowly walk away and throw more material towards the nest, repeating this sequence until sufficient nesting material has been accumulated. A list of plant species used as nesting material is presented in the Table 1 given below:

Authors counted and studied 22 nests (Photograph 4), in Paur Kashi Rampur transect, 16 in Tikara and 8 in Shahpur transect. Female usually lays two eggs (Photograph 5) but sometimes one (Photograph 6) and rarely three.



Photograph 3. Crane with nest



Photograph 4. Constructed nest

Selection of a suitable nesting site and specific nesting material is a vital aspect of nesting behavior of this threatened bird. During routine survey of sarus crane around Alwara lake, authors minutely observed the nature of the specific nesting materials having medicinal and sanitational values. This aspect of study was very useful for the highest breeding success of the sarus crane and ultimately the conservation of this threatened species.

Table 1. Different plant species, their families and medicinal values used in nest building in and around Alwara lake

S. no.	Botanical names of plant	Local Hindi name	Family	Medicinal value
1.	<i>Argemone maxicana</i> (L.)	Bharbhanda	Papaveraceae	Antimicrobial
2.	<i>Oryza rufipogon</i> (Griff.)	Fasahi	Poaceae	Nutritional value
3.	<i>Oryza sativa</i> (L.)	Dhan	Poaceae	Nutritional value, prevents diarrhea and useful in heart related disorder
4.	<i>Cynodon dactylon</i> (L.)	Doob	Poaceae	Antiseptic
5.	<i>Pennisetum typhoideum</i> (Rich.)	Bazara	Poaceae	Nutritional value
6.	<i>Digitaria sanguinalis</i> (L.)	Tikari	Poaceae	Antibacterial and antifungal
7.	<i>Echinochloa colonum</i> (L.)	Shamma	Poaceae	Anti-inflammatory
8.	<i>Sorghum bicolor</i> (L.)	Jawar	Poaceae	Anti-anemic, anti-oxidant with nutritional value
9.	<i>Eichhornia crassipes</i> (Mart.)	Jal khumbhi	Pontederiaceae	Bio-herbicide
10.	<i>Eleocharis dulcis</i> (Burm.)	Hair gross or naryee	Cyperaceae	Supportive and floating antibacterial
11.	<i>Scirpus littoralis</i> (Schrader)	Deer grass	Cyperaceae	Astringent
12.	<i>Cyperus rotundus</i> (L.)	Motha	Cyperaceae	Antiseptic and anti-inflammatory
13.	<i>Hydrilla verticillata</i> (Lf)	Jhangi kureli	Hydrocharitaceae	Detoxification
14.	<i>Ipomoea aquatica</i> (Forssk.)	Patuasaga karmi	Convolvulaceae	Anxiolytic property
15.	<i>Ipomoea carnea</i> (Jace.)	Behaya	Convolvulaceae	Anti-inflammatory
16.	<i>Kirganelia reticulata</i> (Poir)	Mankhi	Euphorbiaceae	Antibacterial and antioxidant
17.	<i>Codiaeum variegatum</i> (L.)	Croton	Euphorbiaceae	Snake repellent; ant diarrhea and anti-epilepsy
18.	<i>Nymphaoides indica</i> (L.)	Kumudani	Menyanthaceae	Bleeding preventive
19.	<i>Typha angustata</i> (L.)	Patara	Typhaceae	Anti-diuretic and anti-depressant
20.	<i>Calotropis gigantea</i> (L.)	Madar	Apocynaceae	Snake and mosquito repellent; anti-microbial
21.	<i>Commelina benghalensis</i> (L.)	Kankavwa	Commelinaceae	Anti-nervous
22.	Unidentified root, stem & leaf		Still to explore	Still to explore

**Photograph 5. A nest with 2 eggs****Photograph 6. A nest with one egg**

4. CONCLUSION

The authors found that cranes used local flora of 21 species [26] belonging to 11 families in nest building in and around Alwara lake. All these 21 plant species have some medicinal values. These plant species act as mosquito and snake repellent and were having natural anti-oxidants, antibacterial, cytotoxic, antiviral, antifungal, fungicidal properties. It was also observed that the cranes used specific shrubs and herbs for protection of health and sanitation as well as defense. Such activities have been confirmed by [31-32]. Besides, some roots, stems and leaves of unidentified plant species were also reported there.

Authors finding that cranes are very sensitive and specific in selecting the nesting material are very fruitful in understanding and formulating the conservative strategy of this crane. The ecological condition of this lake supports the survival of not only vulnerable Indian sarus crane but also several endangered species of fishes and plants, hence there is a compulsory need to understand the conservation priorities and to design and implement conservation action plan. The authors also recommend the Ministry of Environment & Forests, Government of India and Uttar Pradesh for the declaration of the entire Alwara lake as "Sarus Safe Zone" for the conservation of this threatened species. It will save the genetic resources of sarus crane from the danger of extinction.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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