Pollen Rain at Keoladeo National Park (Ghana) Wetland, Bharatpur, Rajasthan

Pollen rain studies of 16 surface samples collected for the first time from different parts of desiccated wetland area of Keoladeo National Park (Ghana)-A world known bird sanctuary, situated at Bharatpur, Rajasthan, have been carried out. Simultaneously, evaluation of air borne or suspended pollen and spores etc. in the environ of the park region has also been done through the analysis of spider-webs collected from bushes/shrubs etc. growing in the sanctuary. The palynological investigations through web samples alongwith the soil samples have provided a comparative account of the retrieved taxa from the vegetated areas of the park. The reconstructed pollen spectra not only portrays overall local vegetation of the region but also prove the spider-webs to be the better substrates for airborne palynomorphs as compared to the soil samples, as the relative frequency of both arboreal and non-arboreal taxa is more in spider-webs.

Key-words : Spider-webs, Pollen analysis, Palynomorphs, Ghana, Bharatpur.

Keoladeo National Park, one of the most spectacular bird sanctuaries in India, is situated between 27°7.6’ to 27°12.2’ N and 77°29.5’ to 77°33.9’ E. It is about 2 km south-east of Bharatpur city, 38 km south-west of Mathura, 50 km west of Agra and about 180 km south of Delhi.

Initially, the park was a natural depression and was flooded after **‘Ajan bund’** (a temporary reservoir outside the park) constructed between 1726-1763 by Maharaja Suraj Mal, the then ruler of the princely state of Bharatpur, at the confluence of the two rivers, Gambhir and Banganga. Later, by impounding and controlling water

level it was developed into a waterfowl refuge (Ali and Vijayan, 1986) and the inundation resulted in the production and growth of a lot of aquatic vegetation, which attracted a large number of migratory birds (of which the Siberian Crane is most popular and Bharatpur is the only place where it migrates and feeds here on Cypress Rotents grass, an underground aquatic root) and therefore the park is also known as **"Bird Paradise"**. The name of the park is derived from an ancient Hindu temple, devoted to Lord Shiva, situated at the centre of the park. Earlier, it was called as **'Ghana'** which means dense or thick forest cover. But, later, it was notified as **bird sanctuary** on 13th March, 1956, a **Ramsar site** in October, 1981 and declared as a **National Park** on 10th March, 1982 and finally named as a **World Heritage Site** under the World Heritage Convention in December, 1985.

The total area of the park is about 29 sq km, which is more or less flat with a gentle slope towards the centre, forming a depression, i.e. submersible area of about 8.5 sq km. The average elevation of the area is about 174 m above sea level. There are 14 villages around the park and a masonary wall (constructed between 1977-1981) separates it from the surrounding agricultural fields. The soil of the wetland area is mainly thick alluvium with some patches of saline soil in the terrestrial areas.

The poor rainfall and inadequate water supply from the Ajan bund led to a drought condition inside the park and therefore the whole aquatic area of the park has become completely dried and appeared as an open grassland during the period of visit and study (December 2002). In addition to that, a part of the area was bulldozed by the forest department to remove the excessive growth of grass and this created an open patch.

No such kind of efforts have ever been made from the Keoladeo National Park and therefore the present study is an attempt to explore the present site and to carry out the pollen analysis through the study of various surface samples. The reconstructed Pollen Spectra as well as Pollen depositional model provide a comparative picture of the taxa retrieved from the soil samples as well as spider-webs. The data generated through these preliminary palynological investigations give an overall vegetational picture of this region, which will help in understanding the vegetational dynamics and successional history of the Keoladeo National Park.

Climate:

The climate is sub-tropical with south-west monsoon as the dominant factor. The onset of monsoon lowers the temperature up to 27°C and continues till October. Winter season continues from November to February (temp. ranges between 7-31.7°C) and hot and dry summer extends from March to June (temp. ranges between 38-45°C).

Vegetation:

The park comprises of forest, woodland, scrub woodland, dense to discontinuous thickets, scattered shrubs, savannah woodland to scattered tree savannah, shrub savannah, grass savannah, low grassland, mosaic of several types and wetlands. About 400 species of flowering plants are recorded from Keoladeo National Park, of which nearly one-fourth inhabit the wetland area – including limicolous and aquatic elements. The dominating taxa found in different vegetation types described above include *Mitragyna parvifolia, Kirgenelia reticulata, Capparis sepiaria, Acacia nilotica, A.leucofolia, Zizyphus mauritiana, Prosopis juliflora, P.cineraria, Salvadora persica, S.oleoides, Syzygium cumini, Cynodon dactylon,*

Sporobolus helvolus, Vetiveria zizanioides, Desmostachya bipinnata, Dicanthium annulatum, Balanites roxburghii, Dichrostachys cinerea, Iselema laxum, Eragrostis sp. The aquatic vegetation consists mainly of emergent, rooted floating, submerged and free floating types (Ali and Vijayan, 1983) of which the most common are *Paspalum distichum, Cyperus alopecuroides, C.rotundus, Scirpus tuberosus, S.articulatus, Eleocharis plantoginea, Ipomoea aquatica, Nymphoides cristatum, N.indica, Hydrilla verticillata, Utricularia inflexa, Potamogeton crispus, Ceratophyllum demersum, Vallisnaria spirolis, Lemna paucicostata, Azolla pinnata* and *Wolffia arrhiza*.

Material and Methods:

A total of 16 surface samples including 8 surface soil and 8 spider webs were collected from different parts of the wetland area during winter season (December, 2002). Spider webs were collected from small pits as well as from the branches of the trees and all the samples were carefully stored in suitable plastic bags.

Samples were macerated following the technique of Erdtman (1943, 69). Soil samples were treated with 10% KOH solution to deflocculate the matrix then washed several times with water after which it was passed through a sieve. The filterate was transferred in polythene jars and treated with 40% HF for at least 6-7 days to dissolve silica. After decanting the HF, the material was then washed with water several times until the sample was free of Acid and then the residue was acetolysed by standard acetolysis method using acetolysis mixture (9:1, acetic anhydride and conc. sulphuric acid). The processed samples for microscopic observation were stored in 50% Glycerine with few phenol drops to avoid microbial contamination. In case of spider webs, samples were treated only with

conc. HCl which instantaneously dissolves the meshes, then passed through a strainer to remove the superfluous matters i.e. small twigs, fruits, leaves, insect parts etc. After washing, centrifuging and decantating the filtrate several times with water to remove acid, the residue was mixed with 10% conc. HF in polythene test tubes and kept only for two days to remove silica. Rest of the procedure is same as that for soil samples. Pollen counted for each sample range between 150-250 depending upon the productivity of the sample. The retrieved pollen taxa have been grouped into arboreals, non-arboreals, aquatics, lower plants and exotics. The reconstructed pollen spectra are based on the total terrestrial pollen and the encountered taxa are arranged in the order viz., trees, shrubs, herbs, aquatics, lower plants and exotics.