

# Palynology of Kathauta Tal, Chinhhat, Lucknow\*

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One meter deep sediment core from Kathauta Tal, ranging in age between 200-400 years before present was pollen analysed. Non-arborescals dominate the arboreals in the pollen assemblage. The arboreal taxa constituted 3-15 per cent of the total assemblage. The main tree taxa identified belong to *Holoptelea*, *Acacia*, *Capparis*, *Combretaceae*, *Myrtaceae*, *Meliaceae*, etc.

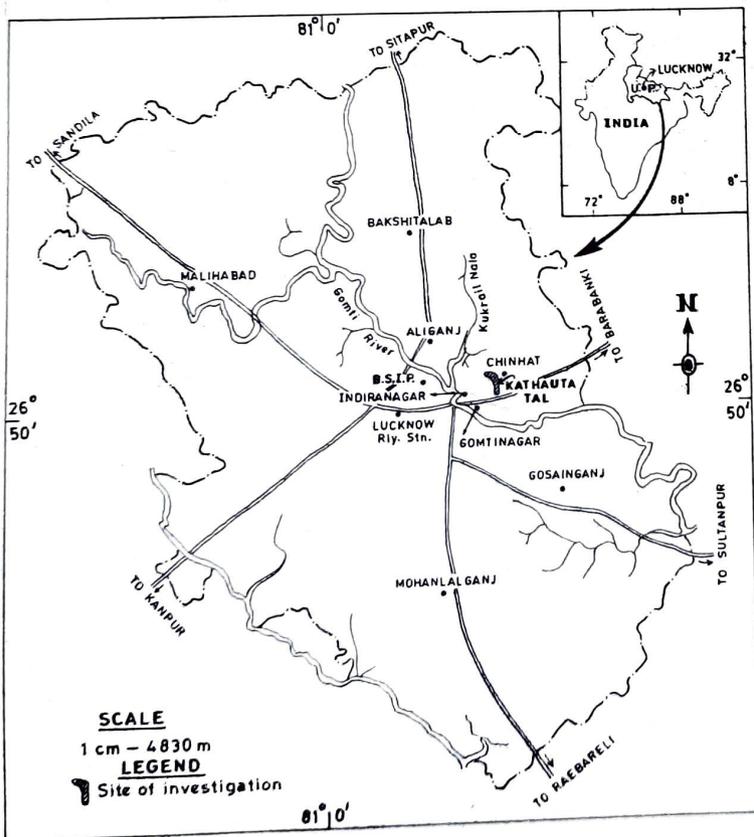
The ground vegetation is largely dominated by grasses followed by *Chenopodiaceae*, *Alternanthera*, *Asteraceae*, etc. *Polygonum plebeium*, *Cyperaceae*, *Eriocaulon* and *Apiaceae* inhabited the marshy land mostly along the lake margin. *Lemna*, *Potamogeton*, *Eichhornia*, *Nymphaea* and *Nymphoides* adequately inhabited the lake.

The palynological study indicated that about 400 years before present, the conditions around Kathauta Tal were treeless and cohere with present prevailing conditions and that crop cultivation was on peak. It is further envisaged that the lake had wider spread, as compared to present day status of the lake providing conducive environs for aquatic and marshy life to thrive.

Key-words - Palynology, palaeofloristic, anthropogenic influence, Kathauta Tal, Lucknow.

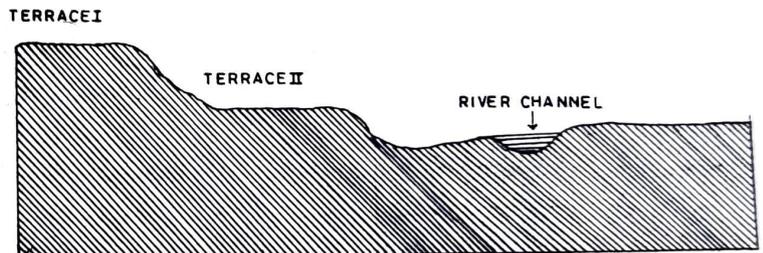
## INTRODUCTION

Kathauta Tal ( $81^{\circ}:26^{\circ} 50'$ ) is situated about 10 km east



Map 1

S



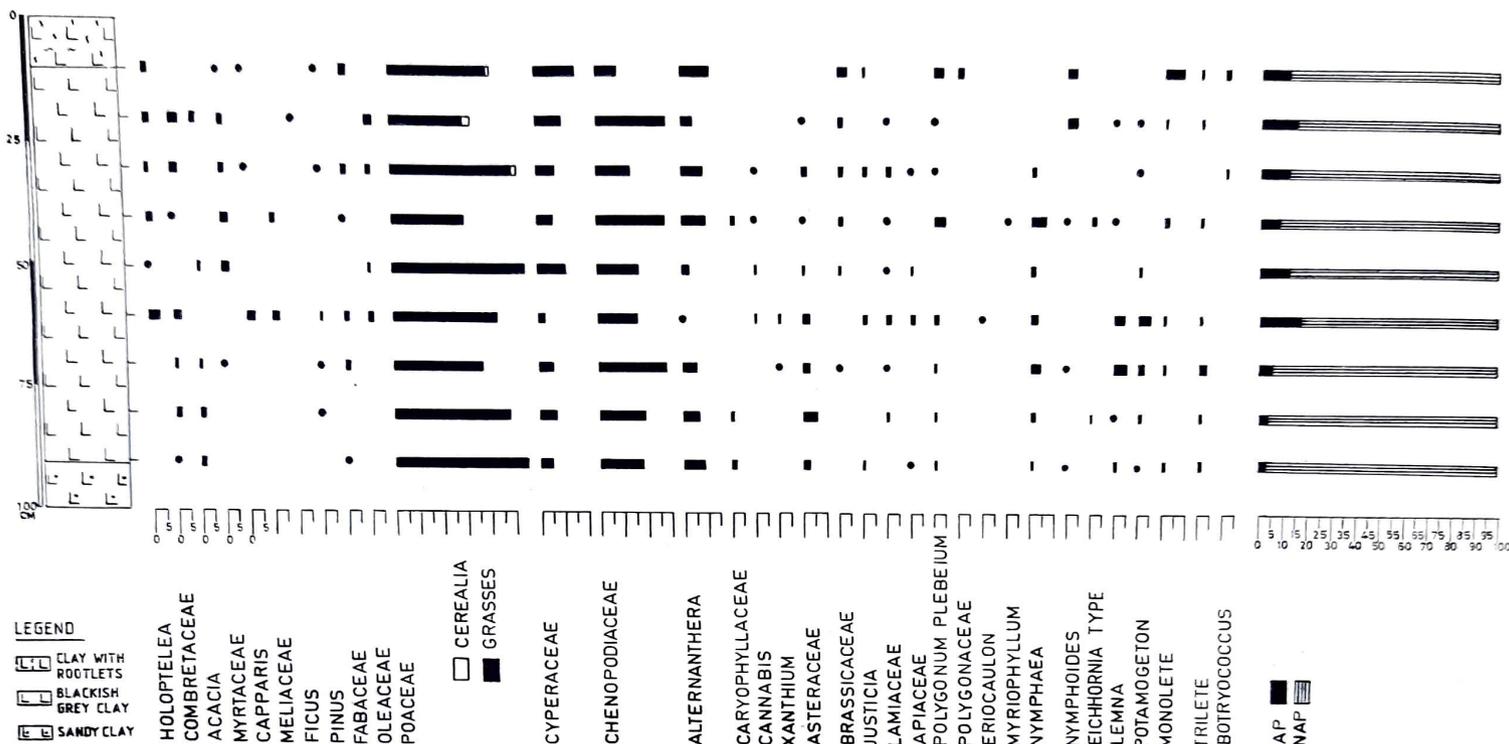
Text-figure 1. Section across Gomti River showing two well-developed terraces on the southern bank (After Mishra *et. al.*, 1971)

of Lucknow on way to Chinhhat (Map 1). It is about 1/2 km long and 100 m wide with irregular margins and about 2-3 meter deep. The lake is perennial and is fed by a number of nalas as well as the water from the catchment area. The water level considerably goes down during summers. The geomorphological features provide evidence of its being like an Ox-bow lake, formed because of a change in the course of Gomti River in the near past. Topographically, adjoining part of the lake is almost uneven. Presently, the area is under extensive crop cultivation.

Most of the area is characterized by the presence of younger alluvium. The alluvial deposits are heterogeneous

## POLLEN DIAGRAM FROM KATHAUTA TAL, CHINHAT, LUCKNOW

( PERCENTAGES CALCULATED IN TERMS OF TOTAL LAND PLANT POLLEN )



Text-figure 2

and are chiefly composed of sand, silt, clay and kankar. The presence of kankars is indicative of excessive desiccation.

The channel of Gomti River displays well marked meanders. The natural levees are moderately developed on the channel sides. The most striking feature along Gomti River is the development of raised river terraces. There are, at least, two well marked terraces extending all along its course (Text-fig. 1). It is difficult to assign the age for these terraces (Mishra *et al.*, 1971). The Gomti River takes a tortuous and often changeable course and this feature seems evident from the presence of a large number of serpentine lakes and depressions.

### CLIMATE

Climate of Lucknow exhibits seasonal fluctuations. Summer season is marked by high temperatures and hot blowing winds with average mean minimum and maximum of 27° and 32.5°C, respectively and goes as high as 46°C during the month of June. Winter season is characterized by severe cold with the mean minimum and maximum temperature of 7.6°C and 21°C, respectively. The average

annual rain fall is 953 mm with an unusual record of 1200 mm. Weather becomes sultry during July to September.

### VEGETATION

Anderson (1859) was the first to explore the vegetation of Lucknow District and enumerated indigenous and cultivated plants. Thereafter, Kapoor (1962), Patil (1963) and Balapure & Srivastava (1964) have studied floristics from ecological and phytogeographical view point.

Lucknow has an open mixed-dry-deciduous type of vegetation. The natural vegetation, although scanty, consists of shrubs, grasses with sparsely distributed trees. Thus, the landscape presents a look of scrub forest. Patches of *Acacia arabica*, *Holoptelea integrifolia*, *Diospyros cordifolia*, *Cordia dichotoma*, *Syzygium cumini*, *Capparis decidua*, *Butea monosperma*, *Mimosa* sp., *Albizia lebbek*, *Flacourtia indica*, *Ziziphus mauritiana*, *Carissa spinarum*, *Azadirachta indica*, *Nyctanthes arbor-tristis*, etc. are scattered. However, a few stands of *Holoptelea integrifolia*, *Syzygium cumini*, *Dalbergia sissoo*, *Bombax malabaricum*, *Acacia catechu* are also found in open areas.

Along the bank of Gomti river, ravine thorn forest, consisting of *Capparis decidua*, *Aegle marmelos*, *Ziziphus mauritiana*, *Carissa spinarum*, *Calotropis gigantea* and *Adhatoda vasica* exists. Recently plantations of *Eucalyptus* sp., *Terminalia arjuna*, *Pongamia pinnata*, *Melia azadirach*, *Prosopis juliflora*, *Syzygium cumini*, *Acacia arabica*, *Parkinsonia* sp., etc. have been raised.

The herbaceous elements of terrestrial nature include *Ageratum conyzoides*, *Euphorbia hirta*, *E. thymifolia*, *Oxalis acetosella*, *Chenopodium album*, *C. murale*, *Ma-lus japonicus*, *Melilotus alba*, *Justicia simplex*, *J. diffusa*, *Solanum nigrum*, *S. xanthocarpum*, *Heliotropium strigosum*, *Launaea nudicaulis*, *Portulaca oleracea*, etc., whereas along the margin of lakes, ditches and in wet places *Polygonum plebeium*, *P. glabrum*, *Rotala* sp., *Ammannia baccifera*, *Alternanthera sessilis*, *Hydrocotyle* sp., *Eriocaulon quinqueangulare* are quite common.

Aquatic vegetation is luxuriant in the lakes, ponds, streams and river. *Eichhornia crassipes* forms a thick mat throughout the water surface often causing blockade. *Lemna polyrrhiza*, *Nymphaea* sp., *Nymphoides cristatum*, *Potamogeton indicus*, *Jussiaea repens*, *Ipomoea aquatica*, *Wolfia arrhiza*, *Vallisneria spiralis*, *Hydrilla verticillata*, etc. are some of the frequent lake water plants.

## MATERIAL AND METHOD

Material for pollen analysis was procured with the help of Hiller's peat-auger with 50 cm long coring chamber. After the trial borings, one meter deep profile from the lake margin was procured and samples were collected at an interval of 10 cm each in chronological sequence. Beyond this, it could not be possible to collect more material owing to the hard stratum.

Samples were chemically processed to deflocculate with 5% aqueous KOH. Thereafter, usual technique of acetolysis (Erdtman, 1943) was followed.

The pollen counts per sample range between 150 to 195 depending upon the pollen potential. Percentages have been calculated in terms of total land plant pollen. The plant taxa have been clubbed together in a sequence of trees, shrubs, herbs and ferns.

## LITHOLOGY

Lithology of the profile does not display significant changes except that the lower most part is largely composed of sandy clay and the upper part is composed of clay mixed with organic mud. However, at the extreme top, little intermingling of the rootlets, etc. could be noticed. The details are as follows:

Depth	Lithology
0-10 cm	Clay mixed with rootlets

10-90 cm  
90-100 cm

Grey clay mixed with organic mud  
Sandy clay

## POLLEN ANALYSIS

Pollen analytical investigation has revealed almost an uniform vegetation mosaic all through the profile. Hence, it could not be possible to segregate the pollen diagram (Text-fig. 2) into distinct pollen zones. The overall vegetation picture reveals the dominance of non-arbores. *Holoptelea* (1.1-4.4 %) followed by Combretaceae (1.4-4.3 %), *Acacia* (0.5-4.0 %), Myrtaceae (0.4-2.6 %) and Meliaceae (3.3 %), although in low values, are the chief constituents of arboreal vegetation. However, they exhibit slight improvement upward. Nevertheless, *Capparis* (0.5-3 %), *Ficus* (1 %) remained sporadic throughout the profile.

Fabaceae (0.5-2.6 %) and Oleaceae (1.3-3.4%) although in low frequency, are the sole representatives of shrubby vegetation.

Herbage is dominated by Poaceae (30-55 %) followed by Chenopodiaceae (8.5-29.2 %), *Alternanthera* (3.3-11.9 %) and Asteraceae (0.5-6.1 %). Brassicaceae (0.5-4.3 %) and Lamiaceae (0.5-2.0 %) are moderately high, whereas *Xanthium* (1 %), Polygonaceae (1.9 %), *Justicia* (1.3-2.3 per cent), *Cannabis* (1 %) and Caryophyllaceae (1.5-2.0 %) are scanty. Among the marshy taxa, Cyperaceae (3.3-16.9 %) is well represented showing improved values upward. *Polygonum plebeium* (0.5-3.9 %) is not consistent throughout rather it has erratically high values between 0-40 cm depth. Apiaceae and *Eriocaulon* are marked by their stray occurrence.

Aquatic taxa are well represented by *Nymphaea* (1.3-5.8 %), *Lemna* (4.9 %), *Potamogeton* and *Nymphoides* (4.5 % each). *Eichhornia* (1 per cent), in spite of its wide spread all through the lake, is not adequately represented by its pollen. *Muriophyllum* (1 per cent) is sporadic.

Fern spores, both monolete (0.5-9.0 %) and trilete (0.5-1.9 %) are present consistently in good values.

## DISCUSSION

Palyndology of Kathauta Tal encompassing a period of about 400 years B.P. has brought out quite interesting features with regard to the vegetational development in and around the lake. Palaeofloristic reconstruction has revealed the dominance of non-arbores and paucity of arbores throughout the sequence. The arbores were feeble in values and represented by *Holoptelea*, *Acacia*, Myrtaceae, Combretaceae, Meliaceae, *Capparis* and *Ficus* along with sporadicity of shrubby elements such as Fabaceae and Oleaceae. However, improvement in some of the arbores in the upper part of the diagram (0-60 cm) could be viewed owing to the recent plantations. Thus, the entire

vegetational composition depicts the presence of mixed scrub forest which is more or less comparable to the present day vegetation of the region. The profuse ground vegetation was chiefly composed of grasses followed by Chenopodiaceae, *Alternanthera* and Asteraceae. The consistent representation of all these taxa in good frequencies throughout denotes the extensive crop cultivation in the region as they are the prominent indicators of anthropogenic activities. The other herbage, viz., Lamiaceae, Brassicaceae, Caryophyllaceae, *Cannabis*, *Xanthium*, *Justicia* and Polygonaceae were sporadic.

The swampy condition prevailing along the margin of lake was profusely inhabited by sedges followed by *Polygonum plebeium*, whereas *Eriocaulon* and Apiaceae were feebly represented.

The aquatic vegetation was quite luxuriant as evidenced by good representation of *Nymphoides*, *Lemna*, *Potamogeton* and *Nymphaea*, more particularly in the lower half of the profile. *Eichhornia*, the chief aquatic element of the lake water, and *Myriophyllum* were extremely sporadic. Thus, the higher values of aquatic plants in the beginning of the sequence suggest that the lake had a wider spread as compared to the present day status of the lake.

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