

Impact of Molecular Identification of Palm Leaves on the Preservation and Conservation of Palm Leaves-Tala Patra Manuscripts

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Abstract

Palm leaves manuscripts preservation is the main target of this research work. Therefore, this research study aimed at molecular identification of palm leaves by DNA Barcoding to assess the potential level on manuscript preservation. This study aims to amplify the *rbcL* and *matK* genes in palm leaves collected from different regions of Bangalore. The DNA was isolated by CTAB method and the amplification was done by PCR analysis. DNA barcoding proved to be an efficient tool for proper discrimination of the related species by generating standers that can be used universally. *rbcL*: A gene found in the chloroplast genome, encoding a large subunit of the enzyme ribulose-bisphosphate carboxylase. *matK*: Another chloroplast gene coding for maturase K, involved in splicing group II introns.

The discrimination is done by accurately sequencing the standard gene region in a very short time (Hebert et al., 2003). *rbcL* and *matK* have been having most recommended and vasty studied DNA barcodes for plants, as they are proved by PWG (Pair wise group) to be potential standardized barcodes for plant DNA barcoding. These barcodes are used to properly identify and discriminate any native or foreign plant species (Maloukh et al., 2017). This work guides us the impact/role of molecular identification-DNA Barcoding of palm leaves on the preservation of Palm leaves manuscripts

Keywords: Barcoding, Polymerase chain reaction, *rbcL*, *matK*.

Introduction

Manuscripts are the primary data as it is closest to the original work. More specifically Manuscriptology is the scientific and structured study handwritten documents. In the context of Library science, a manuscript is defined as any hand written item in the collection of libraries or an archive. For example, a library's collection of handwritten letter or document is considered as a manuscript collection. Therefore, manuscripts occupied top place of honour to the science of Manuscriptology and can be considered as original "Encyclopaedia" of all sciences. We can refer these Manuscripts as the carriers of the culture which link us between the present and the past.

Palm leaves manuscripts play a major role in building the Indian heritage. Though, Manuscripts scattered all over the world, India has about 6 million manuscripts in different languages and scripts. When there were no writing material available, human beings used their brain to store a lot of information, and

priceless old knowledge was kept in human mind. Verbally they used to transmit the information to their next generation. Writing tradition were started in India as early as 5th century B.C. the first reference to writing in India was found in a Pali Buddhists Canon of the 5th Century B.C.

The most commonly used materials for writing manuscripts in the ancient past were tala-patra (Palm-leaf) and bhurja Patra or Sritala (Birch bark) (Agrawal, 1984; John et al., 2016). Palm-leaf manuscripts made of dried palm leaves of *Borassus flabellifer* or *Corypha umbraculifera* were used as writing materials in the Indian subcontinent and in Southeast Asia around the 5th century BC (Shi et al., 2004).

According to ‘**Constitution of India - 1950**’ In Part IV-A under fundamental Duties in article 51A “It shall be the duty of every citizen of India-point no. (f) **to value and preserve the rich heritage of our composite culture.**”(Govt. of India,2015.). Therefore, its everyone duty is to preserve the heritage of India by preserving the PLM.

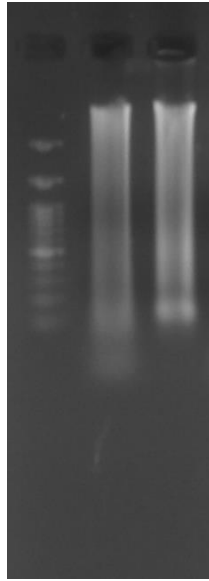
According to **Antiquity and Art treasure act-1972**, manuscripts mean any 75 years old hand written documents which has some literacy, historical and scientific significance. Handwritten documents not necessarily in paper always, it may be on cloth, metal, bark, palm leaf or any other material.

Preservation and conservation are interlinked to mean the purpose of keeping the Palm leaves manuscripts safe from damage and maintaining them for present and future access. The old original manuscripts must be prevented as it is almost impossible to replace them their original form. The original manuscripts will add new dimension to research and development by the information hidden inside manuscripts. India, the government has taken few efforts to preserve the original manuscripts. <https://namami.gov.in/national-mission-manuscripts>

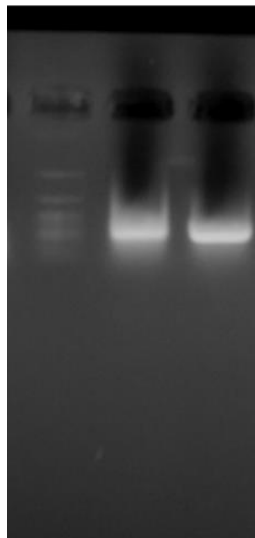
Though there are many types of manuscripts available, we have chosen Palm Leaves Manuscripts in this study. Palm leaves manuscripts predominantly used for recording religious texts, scientific work, ayurvedic medicinal information and other administrative purpose also. Preserving these valuable artifacts requires specialized techniques due to their organic nature and susceptibility to various forms of degradation. Palm leaves manuscripts-Tala patra manuscripts stand a unique position. Because it contains information along with emotional values and faith of a person who had written the manuscripts. In this technological world though writing tradition is declining, we should preserve the available existing written manuscripts of Palm leaves. The Molecular technique -DNA Barcoding is done to identify and classify the palm species based on short, standardized DNA sequences from a specific region of the genome. This process is same as we see in the supermarket where barcodes are used to identify products

Materials and Methods;

The palm leaves collected from the different regions of Bangalore. The leaves DNA isolation was carried out by CTAB method. PCR analysis was performed, which showed amplification of both rbcL and matK regions. Each PCR reaction for testing the amplification efficiency and development of multiplex PCR assays for DNA barcode primers contained 1µl DNA template (25 ng), 2µl 10X reaction buffer, 0.5µl MgCl₂ (50pM), 1µl dNTPs mix (10mM), 1µl forward primer (10pM), 1µl reverse primer (10pM), 0.5µl Taq polymerase (5 U/pi) and the final volume 25µl will be adjusted with molecular grade water. Primers are standard primers available for ITS2 gene amplification.



Genomic DNA isolated from plant, compared with 1000bp ladder



matK and rbcL genes (600bp) amplified from plant, compared with 1000bp ladder

Data analysis

1. Sequencing files obtained will be .AB1 format which can be viewed by using softwares like FinchTV, BioEdit, ChromasLite, SeqScanner etc.
2. Quality of the obtained sequence can be observed through Electropherogram peaks.
3. Analyse the sequencing data using BLAST server or servers related to specific databases The Accession number found was.: KP901247.1 for matK and MG437601.1 for rbcL

Discussion

Molecular identification of palm involves using DNA-based techniques to accurately identify plant species, subspecies, or even individuals. Regions of two different chloroplast genes are used as a combinatorial barcode; the large subunit of ribulose biphosphate carboxylase (rbcL) and maturase K (matK) (Hawkins et al., 2015). The choice and size of each of these barcode regions were based on the technologies for PCR amplification and DNA sequencing that were widespread when the barcode primers

were designed (Heather and Chain, 2016). That's why universally accepted barcode i.e., rbcL and matK barcode are used for the identification of plants.

Accurate identification of the Palm leaves is very essential and important for their safety to assess their potential for further preservation. Palm leaves release few phytochemicals, which inhibits the growth of other plants nearby. These defense mechanisms allow this palm to survive and thrive in environments filled with potential threats.

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