TRADITIONAL CONSERVATION METHODS USED TO PRESERVE INDIAN PALM LEAF MANUSCRIPTS: A LITERATURE REVIEW

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Abstract

Manuscript preservation is an important subject for librarians, archivists, curators, and scholars who care about manuscripts. Palm-leaf manuscripts are more prone to deterioration due to their organic character, making preservation issues severe. Therefore, palm leaf manuscript preservation presents a significant challenge to custodians worldwide. The preservation of manuscripts of the palm leaf has been a major concern since the advent of technology. The objective of this study was to investigate the identification of traditional conservation methods and their use in India. This study used secondary selective Indian sources such as books, journal articles, conference papers, websites, reports of different projects, and case studies to find relevant literature. The literature was analyzed based on two time frames: the variety of palm leaves and the traditional methods used to preserve Indian palm leaf manuscripts. In addition, this study revealed that various traditional plants (herbs) were used to protect the Indian palm leaf manuscripts from insects, pests, and fungi. Dry leaves, dry leaf packs and their powder, and branches and roots of medicinal plants have been used to prevent the destruction of palm leaf manuscripts. Various oils obtained from medicinal plants have been preserved by applying them directly to the surface of manuscripts. As a result, herbal plants have been recognized as traditional preservation methods for the degradation of palm leaf manuscripts. Therefore, to preserve palm-leaf manuscripts for a longer period of time, traditional methods of preservation need to be used.

Keywords: Conservation, Palm leaf manuscripts, Preservation, Traditional Indian conservation methods. Variety of palm leaf

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Introduction

Before paper was invented, palm leaves were a common and significant medium in South and Southeast Asia for writing and paintings (Suryawanshi et al., 1992). Since there are no known examples of palm leaf manuscripts in India before the 10th century, it is difficult to pinpoint the date of the first use of palm leaves (Kumara et al., 2009). Indian scripts have historically been used and modified in various writing materials. Nonetheless, palm leaves served as the primary traditional support material for writing and decorative illuminations in several Southeast Asian countries and the Indian subcontinent (Freeman, 2005). Before the introduction of paper, palm leaves were the most widely used medium for writing and drawing in countries including India, Sri Lanka, Malaysia, Myanmar, Thailand, and Indonesia (Agrawal, 1984).

The rich heritage of the culture of India is attested to by palm leaf manuscripts, which contain descriptions of folklore, religious writings, astrological texts, astronomical data, records of oral traditions and customs, traditional medicine, agricultural sciences, crafts, and skills. These manuscripts offer historical information on the time period, the author, scribe, or copier, the owners, their genealogy, the modern socio-cultural environment, and the geographic setting of the time. In India, the significance of writing has remained unchanged since its beginning. Palm leaf manuscripts are still prepared and used the way preceding generations used them centuries ago (Kumar et al., 2009). According to Meher (2009), palm leaves have very good tensile strength and are three times stronger than hand-made paper because the cell walls of palm leaves are made up of the epidermis. She also says that many manuscripts in India are in the custody of libraries, temples, ashrams, learned institutions and private individuals (Meher, 2009). According to Jarusawat et al. (2018), most palm leaves are kept in museums associated with temples and monasteries, and some are kept in special university libraries. South and Southeast Asian countries, such as India, Nepal, Sri Lanka, Myanmar, Thailand, Indonesia, and Cambodia, mostly relied on palm leaves as one of their principal writing surfaces before the invention of paper. Therefore, it is not surprising that the enormous variety of texts included in palm leaf manuscripts spans many fields, including but not limited to sacred religious scriptures, literature, music, history, medicine, mathematics, and astronomy. As a result, monasteries, manuscript repositories, private residences, museums, and libraries, especially in Asia, have collections of palm-leaf manuscripts (Sah, 2002).

Indian manuscripts include the greatest number of written documents that describe the presence of the cultural riches of the country. These manuscripts are found around India in various monasteries, temples, libraries, museums, private institutions, and individual collections. They were written in different Indian languages.

As Sahoo et al. (2013) point out; India is house to what could be the oldest and greatest manuscript collection in the world. However, because palm leaves are organic, they are more likely to spoil than inorganic materials. These texts frequently degrade "chemically, physically, and biologically." Therefore, the importance of problems with preservation increases. Also, since the organization and preservation of manuscripts have long been the focus of research, there is a significant number of publications related to this field of study. The objective of this study was to investigate the identification of traditional conservation methods and their use in India.

Research Methods

This literature review examines the previous and existing various traditional methods used to preserve palm leaf manuscripts. The study used secondary selective Indian sources such as books, journal articles, conference papers, websites, reports of different projects, and case studies to find relevant literature, which appeared during a period of coverage starting from 1947 to 2021. During the literature

search, subject-specific and search terms such as "variety of palm leaf" and "traditional methods used to preserve palm leaf manuscripts" were used to find relevant literature. This study focused on published online secondary sources on Indian palm leaf manuscripts and their traditional preservation methods. Some databases were used to find the photos of " herbal plants" (Medicinal Plants). The study used a qualitative research approach. The literature was analyzed based on two time frames: the variety of palm leaves and the traditional methods used to preserve palm leaf manuscripts.

Results and Discussion

Variety of palm leaf

Palm leaf is a general team; several geographical areas have local terminology for this type of leaf debris that frequently refers to a wide range of distinct plant species. Palm leaves are referred to as "Ola" in South India and Sri Lanka, "Larn" in Thailand, "Lontar" in Myanmar and various other names in India such as "Tula," "Sritala," or "Karalika" (Agrawal, 1984). Furthermore, Agrawal (1984) points out different kinds of palm leaves worldwide. Only two leaf species, however, are native to India: Srital/Talipot (Borassus flabellifer linn.) and Palmyra (Corypha umbraculifera linn.). These species are widely distributed in the country's east and south, including in the states of Karnataka and Andhra Pradesh, as well as in Odisha, Kerala, and Tamil Nadu.

According to Sah (2002), the general word "palm leaf" is frequently used, particularly in English literature. Vernacular names frequently referring to specific leaf varieties are widely used throughout Asia. This means Palmyra in Myanmar and Indonesia, Ola in Sri Lanka, Larn in Thailand, and Tala, Sritala, or Karalika in various regions of India. Kumar et al. (2009) state that many palm leaves were used for writing in India, including Corypha Umbraculifera Linn (talipot, fan palm), Borassus flabellifer Linn (the palmyra palm), and Corypha Taliera Roxb. The three types of palm leaves are as follows, according to Sageer & Francis (2014): Corypha umbraculifera Linn: The term "Talipot palm" is also used for this. With a 300–400-year lifespan, this is the most durable substance found in palm leaves. 'Palmyra palm' is another name for Borassus flabellifer Linn. The talipot palm has longer-lasting leaves that are thinner, weaker, and more fibrous.

Agrawal (2006) claims that practically every Asian nation has hundreds of thousands of ancient writings written on palm leaves. Before the introduction of palm leaf in other nations, palm leaf was the most often used writing material, especially in Southeast Asian nations like Indonesia, Malaysia, and Thailand. Manuscripts were also written on palm leaves in India and Sri Lanka, particularly in the coastal regions. Mostly found in damp and humid coastal regions of south India, Sri Lanka, Burma, Malaysia, the Andaman Islands, and Thailand, especially along the Malabar Coast, is Sritala, also known as the Talipot palm or fan palm. Over a million palm leaf manuscripts have been found worldwide as of this writing.

Manuscripts on palm leaves written in the past are valuable resources for anyone interested in learning about historical records. Thanks to numerous ongoing efforts for the preservation of ancient documents by libraries and universities around the world, palm leaf manuscripts relating to art and architecture, mathematics, astronomy, astrology, and medicine that date back several hundreds of years are still available for reference today (Butdisuwan & Babu, 2014). Sha (2002) states that while the shape, length, thickness, and color of palm leaves vary among varieties, more investigation is needed to determine the roles that structure, and chemical composition (such as the presence of essential oils) and regional variations play in the resilience, longevity, and resistance to biological attacks of leaves.

Traditional methods used to preserve Indian palm leaf manuscripts.

Being organic in nature, palm-leaf manuscripts are susceptible to decay over time. Whatever contributed to the decline, it eventually led to the decline of palm leaf manuscripts. There is an essential need for the preservation of these manuscripts. In this study, the conservation methods traditionally used in India to preserve palm leaf manuscripts are investigated. According to Agrawal's (1984) study, it is not advisable to keep palm leaves in very dry environments. Different kinds of oil, like walnut, camphor, and citronella oils, can be used to give palm leaves more flexibility. He also mentioned the common practice of seasoning palm leaves in South Asian nations, including Thailand, Sri Lanka, and India.

Various oils were tested by Suryanwanshi et al. (1992) in an attempt to restore suppleness to brittle palm leaves. Applying camphor, eucalyptus, and clove oils under typical atmospheric circumstances has been shown to help increase the flexibility of strengthened palm leaves; these oils are more volatile, light, dry, and readily absorbed into the frond. Magnosa (neem oil), lemongrass, and citrus oils are good at softening and increasing the flexibility of palm leaves in hot weather. She and others also point out that in regions affected by Indian culture, palm leaves were frequently used as a writing surface. It is also recommended to use some traditional treatments to extend the life of manuscripts (Suryawanshi et al., 1994).

According to Joshi, (1995) (as cited by Ghosh et al., 2017) provided some notable examples of early palm leaf manuscripts that are presently in India, such as "Panchmi Kaha," which was written in 1109. He cited various seasoning methods and how they differed from place to place. According to the study, palm leaves are dried and boiled in water in some regions of South India. Any abnormal growth is then cut off with a knife, and the surface is smoothed using gingili oil.

Manuscript preservation is a constant challenge, according to Gupta (2006) (as cited in Sharma et al., 2018). Because it is organic, it can be attacked by fungi, insects, and other pests. Herbs and other natural materials have been employed to protect them. It has been demonstrated that these herbs and other natural compounds are helpful in inhibiting microbial activity. Since this natural plant extract proved to be a sound barrier against the biodegradation of palm leaf manuscripts, the expertise was passed down from generation to generation. Essential oils are a complex blend of natural compounds from plants, flowers, trees, fruits, barks, grasses, and seeds. They are mainly employed as pesticides to kill or repel specific insects. Since these plant extracts are natural, they are considered less dangerous for humans than many chemical products, which are extremely harmful in nature, even at low doses (Gupta, 2006, as cited in Sharma et al., 2018). Jeyaraj (2006) states that various traditional methods for preserving manuscripts are still in use today because their effectiveness has been tried and tested for a long time. Synthetic or natural/medicinal agents should not be used continuously over a long period of time but should be changed from time to time as microorganisms may develop resistance (as cited by Sharma et al., 2018). Sahoo and Mohanty (2004) state that there is now no shortage of modern pesticides and insect repellents for the safe preservation of manuscripts. The adoption of modern technologies has led to increased worries regarding the preservation of manuscripts since the advent of technology. Traditional preservation techniques are still popular because they have advantages of their own, such as:

- These pose no health risks to people.
- These don't negatively impact the materials in any way.
- The techniques don't need a lot of training, resources, or money.

In the context of storing insect damage manuscripts, Sahoo and Mohanty (2004) have tried to summarise the efficacy of Indian herbal pesticides and insect repellents using various traditional methods used by

different organisations to achieve growth. According to Sahoo & Mohanty (2004), Indians comprehend preservation. Since ancient times, several native techniques have been used to preserve manuscripts. The general public was also aware that the leading causes responsible for the destruction of the manuscripts were light, dust, heat, and humidity. Sahoo & Mohanty (2004) state that to protect the writings from possible harm, they usually covered them with clothing. However, manuscript keepers have followed and still follow the following traditions over the years:

- Usually, holes are bored into the manuscripts' leaves, and cords are then threaded through them to keep them together. These are then sandwiched between two flat, rigid hardwood boards that also have the same kind of cord-passing holes. The hardwood boards squish the leaves from both directions, eliminating chipping and edge curling.
- By being wrapped in clothing, the manuscripts are protected from dust, worms, and to a significant part from changes in ambient humidity and the absorption of acidic gases.
- It is traditional to wrap palm leaves in clothing that is bright red or yellow. Insects are reportedly attracted to the colour red, which is also said to be insect-repelling. Additionally, turmeric's yellow hue is thought to have certain germicidal qualities that prevent insects from contacting the manuscripts.
- Manuscripts are wrapped in silk because, despite its long use, it is exceptionally free of bookworms.
- The bundles of manuscripts are also kept in substantial wooden crates to reduce the harsh weather variations.
- Exposing palm leaves in the kitchen is supported by the scientific fact that smoke particles have the ability to repel insects. Even if the smoke deposits change the leaves unintentionally, this procedure effectively prevents insect attacks on palm leaf manuscripts.
- When leaves are exposed to the soft rays of the Sun when it rises or sets, insect and the growth of microorganisms is halted.
- The palm leaves are commonly arranged and fastened together with a bamboo needle and cotton or silk string in order to preserve the integrity of the leaves.
- In other instances, manuscript preservation occurs underground.
- Manuscripts are often exposed to the Sun during the lunar month of Bhadraba since its rays are so beneficial in August. The worms die in the sunlight as a result of this.

According to Suri (1947), one of the ancient techniques used in Jaisalmir to protect manuscripts from white ants is to store little sacks of grass known as "Panadi" among the manuscript bundles. The texts are placed with a different herb, powdered Ghorabach (Acorus Calamus) (Fig. 1), as an insect repellent.

Figure 1

Vacha (Acorus Calamus)

Ghosh et al. (2017) state that historically, manuscripts were frequently kept in kitchens where the smoke from hearth fires kept insects away from the palm-leaf manuscripts. Another technique they described in their study involves boiling or burying palm leaves in water before writing on them to give the manuscripts antibacterial properties. It contributes to the development of insect defence naturally. They said that covering manuscripts in silks shields them from bookworms and other insects that cause minor damage to silk clothing. According to Baquee & Raza (2019), indigenous procedures are those that have been practised from ancient times. Manuscripts can be cleaned and dust-free, wrapped in clothes to keep out dust and insects, kept outside in the sun or treated with Ajwain powder, Custard Apple Seed, Neem Seed, and Black Cumin to ward away harmful insects.

Devanathan (2013) states that because palm-leaf manuscripts are organic in nature, they are prone to deterioration and disintegration over time. Fumigation chambers are typically used to provide chemical treatments to palm leaves to shield them from fungi, white ants, and other insects. Pests get immune to insecticides and other pesticides over time, rendering them ineffective. According to Devanathan (2013), Natural Products and Herbs for Conservation, the following is a list of some of the plants and their products that have been known for their ability to repel insects and have germicidal qualities since ancient times:

1. Dried and powdered leaves of *Ashwagandha* (Fig. 02) *(Withania Somnifera)* in small packets are kept with the manuscripts covered in clothes to repel insect attacks.

Figure 2
Ashwagandha (Withania Somnifera)

2. Pieces of Vacha (Acorus calamus) (Fig. 01) or Shunti (Zingiber officinale) are stored with bundles of manuscripts to protect them from pest attack.
3. Lemon-grass oil (Cymbopogon Citrates) coatings are applied on manuscript leaves to fortify them and prevent the growth of microorganisms.
4. Powdered roots of the dried sweet flag, or Vacha (Acorus Calamus) (Fig. 01), packed into tiny sacks and stored in manuscript cupboards, have excellent therapeutic and insecticidal properties.
5. Some natural ingredients, such as Cove (Syzygium aromaticum), Sandal (Santalum album) wood, and Black pepper (Piper nigrum) have oil extracts that help restore the palm leaf manuscripts' suppleness.
6. Using freshly extracted palm leaf extract may also help give brittle, aged leaves some suppleness.
7. Ajwain (Carum Copticum) powder also functions as a fungicide and insect repellent.
8. To kill the insects that feed on manuscripts, powdered custard-apple (Anona Reticulata) seeds are used.

9. The leaves of mint (Mentha Longifolia) are also anti-ant and anti-cockroach.
10. The black cumin (Nigella sativa) known as Krishna Jeeraka is utilised as an insect deterrent and has a potent aromatic scent. Insects are kept away by dispersing seeds near the manuscript storage.
11. Many libraries utilise sandalwood (Santalum album) dust as a bug deterrent.
12. It is known that a combination of citronella, Neem leaves (Azadirachta Indica) (Fig. 03), Karanja (Cesalpinia Crista), and Nigundi (Vitex Negundo) has insecticidal qualities; as such, manuscript libraries may find use for it.

Figure 3

Neem leaves (Azadirachta Indica)

13. The molecules included in Neem oil are called limonoids, and they function as growth regulators or anti-feed ants in insects. Although they don't kill them right away, they destroy an entire generation of insects by stopping the adults from reproducing and the young ones from growing. Neem seeds and leaves that have been dried are very helpful at repelling insects. Therefore, its application has been well-acknowledged since ancient.
14. Naga-damani, sometimes called Indian worm wood (Artemisia Nilagirica), has an essential oil that helps keep insects away from manuscripts by having a pleasant scent.
15. In India, Camphor (Karpura) (Cinnamomum) another natural substance, is frequently utilised to safeguard priceless papers.
16. In some repositories people use Vermillion or Kumkum fruit powder (which is red in colour) that act as a very good insect repellent.
17. Because of its renowned insecticidal qualities, a mixture of Neem leaves, Karanja, Nirgundi, and citronella could be utilized in manuscript libraries.
18. Additionally shielding the manuscripts from bug attacks are dried Tamakhu leaves. Usually, the leaves are arranged on the shelves where manuscripts are stored or placed into tiny fabric bags. The insects are repelled by the leaves' nicotinic acid.
19. The leaves of the five-leaved Chaste tree (Vitex Incisa) are preserved with the manuscript bundles after being dried in the sun. It is widely used in Orissa because these trees are cultivated there in large quantities.
20. In some libraries, the planks are made of neem wood, which can fend off termites, because the wooden planks attached to the bundles of manuscripts are vulnerable to insect assault.
21. Once a year, the leaves are treated with coconut leaf juice (Coccinia Indica), wood charcoal, and turmeric paste using a clean cloth. This leaf the leaves resistant to fungal and insect damage.
22. It is commonly known that applying turmeric paste to seasoned palm leaves has a disinfecting effect.

Additionally, many scholars have mentioned oils produced from various traditional materials used in India to protect palm leaf manuscripts from insects and pests. Sharma et al. (2018) stated that Citronella oil, Neem/Neem oil, Cedar Wood oil, Clove/Clove Oil, Sandalwood/Sandalwood oil, and Camphor/Camphor oil have antibacterial, antifungal, antiviral, and insecticidal properties.

Borthakur (2021) states that theft and vandalism are possible in a library or museum that preserves manuscripts. The following actions have been suggested by:

- Improper handling of manuscripts
- Improper storing techniques
- Lack of professional training Absence of professional communication between institutions and institutions with similar goals. The following are some common corrective actions taken by curators or conservators:
- Using naphthalene balls, citrus fruit, salt, table salt, lemongrass oil, or neem oil or extract.
- Periodic Manuscript Sunbathing in Shade at Minimum Temperature.
- Periodically exposing the manuscripts to the lowest temperature of the sun
- Acid-free red cloth wrapping the manuscript.

Garlic can also be used for this purpose because it possesses antibacterial, antifungal, and insecticidal qualities, according to Patidar & Soni (2016). Keeping Tejpat leaves in packs for manuscripts covered with cotton repels insects. To keep insects away, eucalyptus leaves are stored in manuscripts that are wrapped with cloth. In order to keep insects away from stored palm fronds, Tulsi leaves (Fig, 04) are also combined with them.

According to Patidar & Soni (2016) and Sahoo & Mohanty (2004), in India, palm leaf manuscripts can be found in large collections in libraries, museums, and private collections. It is clear that various traditional methods for the preservation of manuscripts have been tried and tested over a long period of time.

Figure 4

Tulsi leaves (Ocimum tenuiflorum)

Conclusions and Recommendations

Through a literature review, it was also possible to identify that there are different types of palm leaves in different regions of India. It was also revealed that they have been known by different names. Since they are made up of organic materials, they deteriorate with time. Nowadays, modern tools and methods have been developed for the preservation of manuscripts, physical treatment for the palm leaf

manuscript is not done here. But in the past, traditional methods were used to preserve manuscripts up to the present day. Therefore, attention has been directed to traditional methods used to protect palm leaf manuscripts in the past. This study was primarily conducted on the basis of the traditional conservation methods used for the preservation of palm manuscripts in India. During the examination of the articles, it was revealed that traditional methods of preservation were widely used for the preservation of manuscripts of the palm leaves of the articles published by Indian authors. It is hoped that this investigation will help advance the field of conservation. It is hoped that this investigation will help advance the field of conservation. This article has attempted to summarize the effectiveness of traditional conservation methods.

Examining the published articles on these traditional methods of preservation, it became clear that various methods have been used for the preservation of palm manuscripts. That is, wrapping silk cloth as well as red and yellow cloth. Also, palm leaf manuscripts are prepared for smoking in the kitchen, exposed to sunlight, and stored in wooden boxes. Neem wood is mostly used to make these boxes. In addition, this study revealed that various traditional plants (herbs) were used to protect palm leaf manuscripts from insects, pests, and fungi. Insect, pest, and fungal damage has been prevented through the use of dried leaves, dry leaf packs and their powder, and the branches and roots of medicinal plants. Various oils obtained from medicinal plants have been widely used. In the preservation of palm leaf manuscripts, those oils have been used directly on the surface of the manuscripts. Herbs identified in this literature review are not risky to humans and the environment and do not harm palm leaf manuscripts. One of the biggest problems Indian curators encounter is the preservation of manuscripts. As a result, herbal plants have been recognized as traditional preservation methods for the degradation of palm leaf manuscripts.

Manuscripts on palm leaf deteriorate naturally since they are made of organic materials. Therefore, in order to preserve palm leaf manuscripts for a longer period of time, traditional methods of preservation need to be used. Manuscripts are the primary source of Indian culture and tradition, and manuscript collections are found all over India. It was also revealed that India has done a lot of research on traditional methods, as palm leaf manuscripts cannot be handed down to future generations without proper preservation. Also, the traditional conservation methods used to protect palm leaf manuscripts can be called low-cost processes.

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