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QUEEN SIRIKIT
MUSEUM OF TEXTILES
พิพิธภัณฑ์ผ้าในสมเด็จพระนางเจ้าสิริกิติ์ พระบรมราชินีนาถ

Our Ancestors Knew Best:

Traditional Southeast Asian Textile Treatments and their Place in Modern Conservation

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Our Ancestors Knew Best: Traditional Southeast Asian Textile Treatments and their Place in Modern Conservation

A SEAMEO SPAFA and QSMT Publication

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QUEEN SIRIKIT MUSEUM OF TEXTILES

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Message from SEAMEO SPAFA Centre Director Dr M.R. Rujaya Abhakorn

SEAMEO SPAFA was very honoured to join hands with Queen Sirikit Museum of Textiles in conducting two important events in 2012 and 2016 in Thailand to revive textile traditions of Southeast Asia. For centuries the art of textile weaving has played a prominent role in Southeast Asian societies, culturally as well as economically, as the bountiful natural resources of the rainforests, the local flora and fauna were intelligently used to serve several purposes of our lives from birth until death. Woven cloths were more than shrouds for protecting the body. They carried signs, auspicious symbols and dreams. They were indispensable in the conduct of sacred rituals that marked the essential steps in both the natural and societal life cycles. Even plain cloths were treated as commodities of exchange and valuable gifts fit for royalties. Knowledge was developed on the art of storing and taking care of textiles using appropriate natural materials which have proven efficacious.

Unfortunately, this form of knowledge is almost lost in the modern age. Much of textile preservation training and practices in Asian museums today are almost entirely based on Western practice, with the need for imported materials and often, chemical-based methods.

Following the joint “Training Workshop on Contrasting Textile Conservation Methods in Southeast Asia” between SEAMEO SPAFA and Queen Sirikit Museum of Textiles in November 2012, it was apparent that there are many traditional procedures and materials used in textile conservation for cleaning, storing, and pest mitigation or control. However, not much has been done thus far to gather traditional know-how and beliefs in the region.

The Regional Forum that followed in August 2016 on “Capturing and Sharing Traditional Methods in Textile Preservation in Southeast Asia” was a chance to pause and rethink how current practices of modern textile conservation in Southeast Asia may integrate the traditional ways of conservation which present innovative parallel or alternative approaches. The rich source of time-honoured indigenous practices can enrich the methodology for the study and care of textiles. These traditional approaches continue to prove to be cost-effective, locally accessible, ecologically sound – both for the environment as well as people’s health.

This work is part of the early stages of safeguarding measures as we research, identify and document the varied methods and beliefs. By working on a regional scale, we can better compare and appreciate our common threads – shared wisdom, practices, ingredients, and shared histories of the region.

In a sense, this is a humble way of paying respect to our traditional knowledge bearers and weavers by valuing and appreciating their wisdom and customs. SEAMEO SPAFA and QSMT are highly grateful to the contributors of this publication for their hard work, going to the field, interviewing weavers and elders, documenting, and writing the fragrant homegrown recipes filled with vetiver, patchouli, and citronella, enriching not only textile conservation practices but also enriching the lives of all concerned as well. We feel privileged to have this opportunity to join with our regional friends in transmitting this priceless heritage to future generations.

QUEEN SIRIKIT
MUSEUM OF TEXTILES
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Message from QSMT Director
Ms Piyavara Teekara Natenoi

On behalf of the Queen Sirikit Museum of Textiles (QSMT) and the Executive Committee of the SUPPORT Foundation, we are honoured to support the research project and publication “Capturing and Sharing Traditional Methods in Textile Preservation in Southeast Asia” with SEAMEO SPAFA. It was also a particular pleasure for us to host a regional Southeast Asian conservation forum in 2016, and in fact, it was the second SEAMEO SPAFA workshop we hosted. After the first workshop “Contrasting Textile Conservation Methods in Southeast Asia” in 2012, it was apparent that a forum where participants could share their wisdom and experience of working with traditional Southeast Asian textiles and discuss methods and materials for cleaning, storage, and pest mitigation or control was needed. The “Capturing and Sharing Traditional Methods in Textile Preservation in Southeast Asia” project addresses the critical care of textiles in Thailand and Southeast Asia’s hot and humid climate, and QSMT was honoured to collaborate in utilizing its facilities, expertise and materials to promote conservation decisions that are cost-efficient, practical, and locally available.

The QSMT mission is to collect, display and preserve textiles, and serve as a centre for everyone who wishes to learn about textiles from Southeast Asia, South Asia, and East Asia. We concentrate on the cultural heritage of Thailand through the textiles of the royal court from 1782 to the present. Our exhibitions and programmes are designed to create awareness and appreciation of Thai identity through both royal and village textiles, including Thailand’s diverse cultures. We are honoured to be part of the preservation and transmission of folk wisdom, as well as advances in conservation science, especially in the field of textiles. I strongly hope this book will help people to find local substitution materials and contribute to the transmission and growth of this knowledge for the next generations.

FOREWORD

Douangdeuane Bounyavong
Author and Textile Researcher
Laos

First of all, I would like to express my appreciation for the efforts of all the researchers, guardians and collectors of antique textiles in Southeast Asia, as well as the contributors who enabled this book to be produced. We have learnt and gained a lot of knowledge from the past, especially in the use of plants and natural substances, which are the heritage of our lands.

When we talk about how to preserve handwoven textiles, as well as costumes made from local materials in Southeast Asia, Lao women who are responsible for the whole production process are key persons who protect and preserve their production.

Unfortunately, we do not have enough clear information on how our ancient ancestors took care of their clothes and textiles. Some pieces of this knowledge have been kept alive, such as keeping the items in a safe place away from insects, or from termites by wrapping the items with cloth or pure paper and storing them in a tube, well closed with a lid.

In my opinion, I think that the lifestyle of people in Southeast Asia who have lived associated with agriculture, including growing cotton, growing mulberry and raising silkworms since ancient times, has created peoples who are guardians of the sustainable relationship between them and the land, the water, the plants and the environment. This connection is reflected in their behaviour towards the culture of wearing clothes and textiles, which are mainly produced by women, and the way they carefully use their clothes and their textiles – preserving them so they have a long life, and wearing them for the right activities and for the right occasions. All the ways of living and behaving mentioned above tell us how much the ancient peoples absorbed and respected the value of their textiles in the culture of wearing clothes, and also in economic values, for example, of the labour used and of the environment, when they used natural plants in the dyeing process.

Nowadays, the world is facing issues of climate change, of declining natural resources, and therefore it is the right time to study, adapt and adopt the knowledge of our ancestors, exposing their know-how widely to society and taking actions for reversing the situation and saving the natural world.

Douangdeuane Bounyavong
Author and Textile Researcher
Written at Hor Thaeng Taeng, Thousand Bamboo Garden, Laos, 1 May 2018.

Dinah Eastop
Lecturer and Author on Textile and Material Culture Conservation, United Kingdom

It is an honour to contribute this foreword. *Our Ancestors Knew Best: Traditional Southeast Asian Textile Treatments and their Place in Modern Conservation* is important as a record of an inspirational project. It documents recent research linking key issues in conservation. Conservation practices and conservation research demand understanding of materials and processes manufacture and change (both modification and deterioration) and of human values (Jones and Holden 2008); what matters, to whom and why. *Our Ancestors Knew Best* exploits both the material and the social sciences and integrates findings from each to understand and inform the conservation of heritage and natural resources.

The book's *Introduction* makes it clear that the reported research reflects, and is informed by, key aspects of recommended practice, notably a person-centred approach to heritage conservation. The project demonstrates the importance of integrating culture into development projects (Kettle and Saul 2004). The research records the use of saponins (plant-derived cleaning agents - surfactants/ detergents), within the region, in cleaning textiles. The research is informed by: the wish to optimize the use of locally and regionally available natural resources; the aim of reducing the need to import costly and environmentally unfriendly detergents; the urgent demands of nature conservation; the wish to record and preserve local land-use practices; and the conservation of cultural heritage. Exploration of these distinct but inter-linked themes provides a model for future research and highlights interdependencies in conserving tangible and intangible heritage. I look forward to reading the *Country Reports* which form the basis of the book.

I would like to highlight what makes this publication exceptional. Three features stand out: the study is regionally specific; it links heritage and nature conservation; and it demonstrates respect for local knowledge and experience as well as for scientific expertise. This research is the outcome of an ambitious and carefully managed project to harness local knowledge and practical expertise in ten countries in Southeast Asia. Once common objectives and strategy had been agreed, the project relied on local engagement and the expertise of those familiar with the use of saponin-based surfactants, in each of the ten countries. This is a huge achievement in many ways, not least in coordination locally, nationally and across the region of Southeast Asia. It is an inspirational precedent.

Recognizing, developing and capitalizing on the links between the conservation of nature and cultural heritage is important, especially where changes in land use can be swift, and sometimes followed by unpredicted and sometimes irreversible consequences. Finding effective ways to exploit plant-derived surfactants for the conservation of valued textiles may also have longer-term benefits to local economies and environments. It is widely recognized that, to be effective, cultural heritage conservation requires both community engagement and community management. This research arises from community engagement and shows how an interregional organization can encourage, support and sustain innovative and applicable research regionally, nationally and locally.

Such community mobilization and engagement were features of an influential precedent, a conservation project in Phrae, northern Thailand. The aim of this community engagement project, led by Patcharawee (Jay) Tunprawat when she worked at SEAMEO SPAFA, was to encourage sustainable development in the broadest sense, social, technological, ecological and economic. The project encouraged local school children and other residents to explore the tangible and intangible heritage of the region. Community-based work included research into old timber buildings and local indigo-dyeing. During the CollAsia 2010 International Course, participants spent a day at the Kaewwanna Indigo Museum, led by Wuttikrai Phathong. We witnessed key stages in the production and consumption of indigo-dyed cloth: the leafy bushes (the source of the dye), the dye vats, the dyeing, the blue-dyed cottons (cloth and clothing) and the museum's shop.

Establishing and re-establishing links between locally grown and renewable plant resources with the needs and demands of consumers is important. A study of Jamaican lace-bark provides an interesting case study (Brennan et al. 2013). Useful, but sometimes overlooked resources include "economic botany collections", where plants and their products were and are collected to demonstrate their utility or potential utility. Notable examples include the Economic Botany Collection at the Royal Botanic Gardens [Kew Gardens] in London, UK (CEBED 1998), and the Museum of Economic Botany in Adelaide, Australia (Emmett and Kanellos 2010). Collaboration with centres studying other harvested resources, such as bamboo and rattan, might also be fruitful.

Our Ancestors Knew Best uses both the material and the social sciences and integrates the findings of each. The scientific research provides information on the physical and chemical properties of the saponin-containing plants and the resulting natural surfactants/detergents. Findings from the interviews and the observations of the fieldworkers in each country record how the saponins are produced and what qualities are considered desirable in the washed textiles by those who use, own or wash them. The use of saponins in cleaning textiles extends beyond the region of Southeast Asia and has a long history in domestic laundry and more recently in textile conservation. A notable study of the suitability of saponin surfactants in textile conservation was undertaken by Petra Czerwinske and published in German (with an English summary) in 2008. As an example of saponin's use in textile conservation, a root-extract was used in wet-cleaning a set of Beauvais tapestries displayed in the setting for which they were designed in the 1780s. The tapestries, which had hung for two hundred years in a palatial castle sited in a rural part of Scotland, were dusty but free from the tenacious soiling found on tapestries hung in urban settings. Washing with root-derived saponin proved very effective in soil removal and re-established the colour and lustre of the tapestries' wools and silks. A presumption may be that what is "natural" is good or safe; naturally occurring chemicals include plant toxins.

I look forward to the next stage of this research collaboration.

Dinah Eastop, PhD, MA, FIIC, ACR, FHEA
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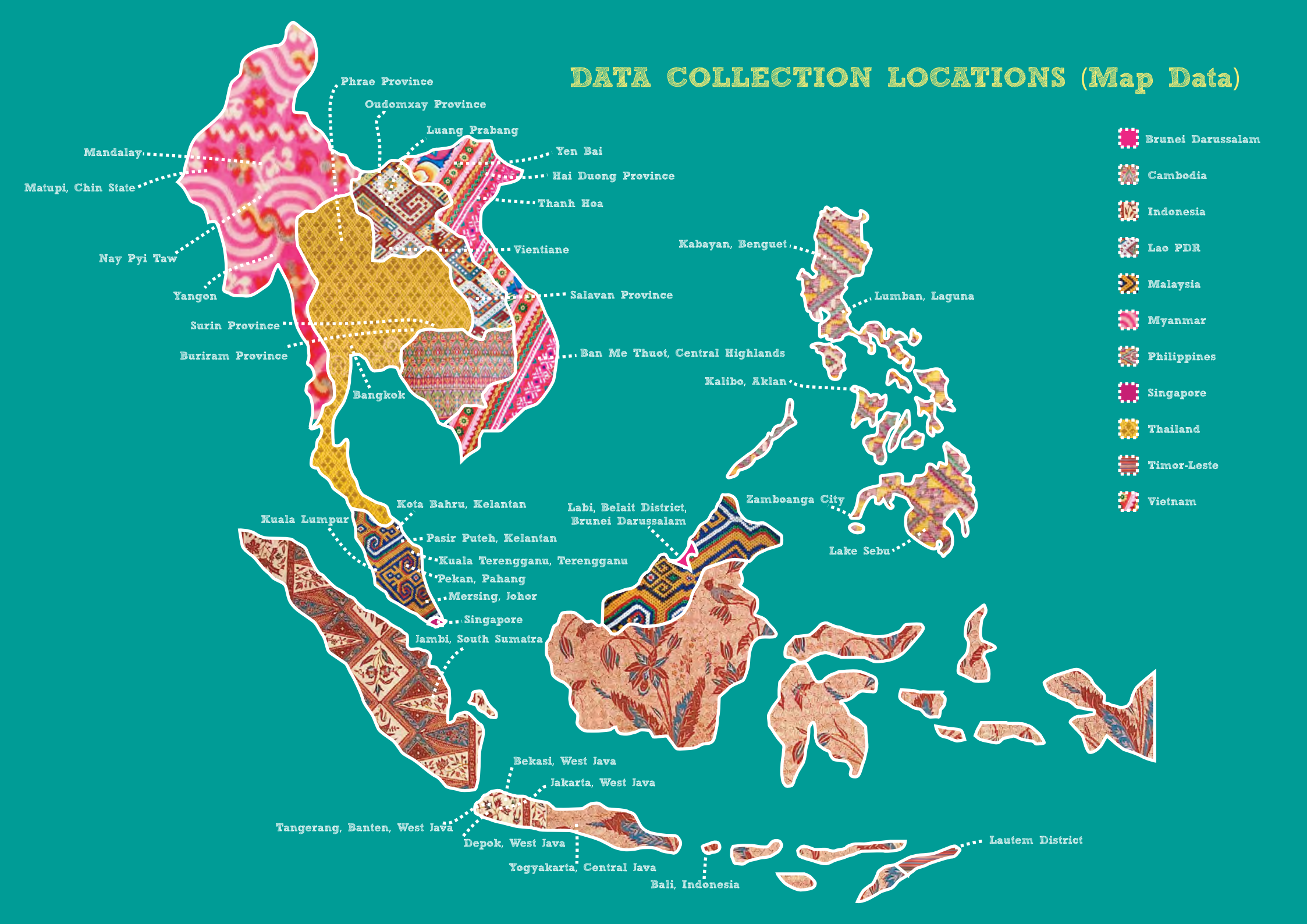

DATA COLLECTION LOCATIONS (Map Data)
Phrae Province
Oudomxay Province
Luang Prabang
Yen Bai
Hai Duong Province
Thanh Hoa
Vientiane
Salavan Province
Ban Me Thuot, Central Highlands
Bangkok
Surin Province
Buriram Province
Yangon
Nay Pyi Taw
Mandalay
Matupi, Chin State
Kabayan, Benguet
Lumban, Laguna
Kalibo, Aklan
Zamboanga City
Lake Sebu
Labi, Belait District, Brunei Darussalam
Kota Bahru, Kelantan
Kuala Lumpur
Pasir Puteh, Kelantan
Kuala Terengganu, Terengganu
Pekan, Pahang
Mersing, Johor
Singapore
Jambi, South Sumatra
Bekasi, West Java
Jakarta, West Java
Tangerang, Banten, West Java
Depok, West Java
Yogyakarta, Central Java
Bali, Indonesia
Lautem District
Brunei Darussalam
Cambodia
Indonesia
Lao PDR
Malaysia
Myanmar
Philippines
Singapore
Thailand
Timor-Leste
Vietnam

LINH ANH MOREAU

Programme Officer
SEAMEO SPAFA

Linh Anh joined SEAMEO SPAFA as Documentation Officer in 2013 and became Programme Officer in 2015. She completed her BA and MA in Southeast Asian Studies at the School of Oriental and African Studies, University of London (SOAS), and a Master in Communication at the University of Paris Sorbonne Nouvelle where she also worked at the Student Affairs Office in developing student-led cultural projects. Prior to joining SEAMEO SPAFA, she was an Art Docent at the Asia Society Texas Center and gained work experience at various institutions including the UN and the French Research Centre on Contemporary Southeast Asia (IRASEC).

INTRODUCTION

by LINH ANH MOREAU

Summary

Traditional methods of textile preservation in Southeast Asia incorporated indigenous knowledge of plants and their natural chemical attributes to make detergents, preservatives, pest deterrents and pesticides. Textile conservation methods evolved away from these sustainable, environmentally friendly practices, as modernization spread and synthetic chemical alternatives became globally available. As we look towards more local sourcing to support human activities, it is important for modern conservators to record traditional knowledge, identify plants and apply traditional practices where possible in their own conservation work.

This is the first project to research and quantify traditional methods of textile preservation in Southeast Asia. As conservators, the knowledge and practices of our ancestors and elders underpin continued growth in our conservation practice. This project is the start of forming a textile conservation practice in the region, combining aspects of unique indigenous knowledge with imported empirical data from Europe and elsewhere.

The work, data and research presented in this book are the results of a collaborative project between the Southeast Asian Ministers of Education Organization Regional Centre for Archaeology and Fine Arts (SEAMEO SPAFA) and the Queen Sirikit Museum of Textiles (QSMT), entitled “Capturing and Sharing Traditional Methods in Textile Preservation in Southeast Asia”. Our quest was to record ancient wisdom about Mother Earth’s natural cleaning agents to use as cost-effective and environmentally friendly modern solutions. Thus from March 2016 until December 2017, traditional methods and associated plants used in the preservation of textiles were documented in ten Southeast Asian countries through field interviews and research, and then compiled drawing from diverse fields of practice.

Following the successful completion of research, documentation and compilation activities that drew from the fields of anthropology, chemistry, conservation and ethnobotany, this book includes country reports, a database of plants, recipes, a pedagogic guide to scientific principles in textile conservation, and a series of educational posters. In the short term, it is hoped that this project can help conservators incorporate cost-effective traditional practices as one important tool in their suite of conservation solutions. In the long term, it is hoped that this preliminary documentation will help the field of textile conservation contribute to addressing United Nations Sustainable Development Goal #12[1] that is intended to create sustainable consumption and production frameworks to meet the needs of human activities.

1 The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. Adopted in January 2015, the 17 SDGs are intended to frame international development and related activities through 2030 in an inclusive suite of specific goals. http://www.undp.org/content/undp/en/home/sustainable-development-goals.html

Background

Karen textiles and a portrait of their weaver. Photograph taken during the pilot research phase in Phrae Province, Thailand (Source: Queen Sirikit Museum of Textiles)

The catalyst for this project on documenting traditional knowledge in textile preservation began with an exchange of conservation tips during the first collaboration between SEAMEO SPAFA and QSMT: "Contrasting Methods in Textile Conservation in Southeast Asia," held in November 2012. Representatives from nearly all the 11 participating Southeast Asian countries discussed the challenges of obtaining museum-grade conservation materials, especially for cleaning textiles. Serendipitously, the Myanmar representative, Ms Khin Htet Wai from Mandalay's National University of Arts and Culture, mentioned using traditional plants to make natural detergents. This comment triggered an immediate discussion that illustrated the need to capture this knowledge as practised throughout the region; and so the project was born!

The sharing of this information revealed an opportunity to think about rediscovering traditional cleaners as potential substitutes for commercial detergents. Not only would the plants be locally available, and thus less costly, they would also be eco-friendly. It became clear that such use of local plants was highly variable as a result of different topographies and climates; thus, to truly unearth the breadth of possibilities within traditional practices, multiple countries needed to be engaged.

In order to explore the possibility of a potential research project on documenting traditional plants used in textile preservation, a joint SEAMEO SPAFA and QSMT team conducted preliminary research in Phrae Province in northern Thailand. This specific location was chosen as previous activities in the area revealed that Phrae community leaders and members remain actively engaged in the preservation of local heritage, as well as such practices as handweaving cotton and indigo dyeing.

The fieldwork conducted in Phrae revealed custodians of tangible and intangible textile heritage, both young and old, with recollections of family elders either directly engaging in or recalling memories of these traditional practices. The fieldwork clarified four different categories of usage: wet-cleaning, stain removal, pest mitigation and fabric/colour treatment. QSMT built on the Phrae research, broadening the Thai pilot project to five regions and twenty interviewees, as well as a study of textile care practices in the royal court. Overall, in Thailand, 26 plants were identified, including eight saponin plants and five insect repellents. These findings were published in the 2014 ICOM-CC preprints in a paper entitled "Before they are gone: Capturing and sharing the traditional methods of textile preservation in Thailand" presented at the 17th Triennial Conference in Melbourne.

Methodology

The Thai pilot research inspired the dedicated team at QSMT to develop the research guidelines for a broader Southeast Asian-wide project to include ten Southeast Asian countries in total: Brunei Darussalam, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste and Vietnam.

SEAMEO SPAFA engaged its network of Southeast Asian museums and conservation professionals with the help of its Governing Board Members. Qualified and curious research partners were identified and nominated to conduct research in their own country. The methodology included questionnaire templates for the interviews, a sample table of plants, and a literature review. Receivables for each country included an average of ten in-person interviews, accompanying photography and film footage, two plant-based recipes for textile preservation purposes and a short country report. The research was conducted in all SEAMEO member countries, with the exception of Cambodia, due to difficulties in obtaining an available researcher. Two researchers represent Indonesia: one in Java, an island renowned for its batik traditions, and the other in Bali.

In August 2016, nearly all researchers attended a regional forum in Bangkok at the QSMT to present their research, exchange knowledge, and formulate alternative textile conservation methods tailored to regional needs. Ms Julia M. Brennan, Chief Conservation Consultant at QSMT's Conservation Department, moderated the discussions, connecting the dots between the various countries and practices.

The forum was also focused on scientific analysis of the plant materials and data, in order to quantify results and provide solid recommendations. Dr Lilian García Alonso-Alba, Conservation Scientist at Mexico's National School of Conservation, Restoration and Museography (ENCRyM), led the scientific component and ongoing testing. She led a workshop covering basic scientific principles in textile conservation cleaning, and the testing of four plant-based detergents against typical chemical detergents. Silk and cotton, polar and non-polar stains, were part of the study, and ongoing scientific analyses was continued in her institution's laboratory in Mexico, the results of which are published in this book. The hands-on scientific testing provided fundamental scientific and analytical skills and criteria to emerging conservators and specialists in Southeast Asia.

Julia and Lilian led the conservation laboratory activities at the Regional Forum on 23-25 August 2016. (Source: Queen Sirikit Museum of Textiles)

Detergents were prepared using concentrates extracted from plants to test their efficiency at the Regional Forum. (Source: Queen Sirikit Museum of Textiles)

This publication is the culmination of the research project to date, presenting summaries of the country findings, plant data, scientific teachings and results, and information accessible to the conservation practitioner as well as to textile enthusiasts and heritage professionals.

This book is the first of its kind to present plants and practices from age-old wisdom used in the preservation of textiles dedicated specifically to practices in Southeast Asia. With an intended distribution throughout a broad network of heritage professionals in Asia, Europe and the Americas, we are hoping for opportunities to learn of similar plants and practices from beyond the area studied herein, in other tropical regions of the world. In fact, this initiative represents merely the beginning of ongoing research into viable cultural heritage preservation alternatives for organic materials such as textiles and baskets, in particular.

How to use this book

Executive Summary

The abridged summary of the overall findings and conclusions drawn from all the data (country reports, plant databases, interviews, recipes and bibliographies), is a short distillation of the whole project. It presents an overview that provides a sense of perspective and priorities for the current research, as well as recommendations for the future, data highlights and commonalities.

Country Reports

This section includes the 11 country reports, written by a passionate group of young, vibrant conservation and museum professionals. Each summary includes a brief history of textile preservation in that specific country or region, the current status of textile treatment practices (living, dying or extinct), the specific plants, and the purpose and use for each plant. Plant names are stated in either English, Latin, or both, and referenced by the table number, referring to the five plant tables located in the middle of this book.

Recipes & Storage

The recipes and methods are divided into three categories of purpose: 1) wet-cleaning, 2) stain removal and 3) storage and pest mitigation.

1. For wet-cleaning, various recipes are provided to reflect the diversity of plant forms. One recipe (soapnut) uses dried fruit, the second (bồ kết) uses pods, the third (baimee) uses leaves, the fourth (fenugreek) uses seeds. The last recipe (ash-lye water), broadly practised, is an “extreme” or harsh cleaning method.

2. For stain removal, two recipes (lime and bilimbi) were chosen due to their wide availability regionally. Burmese thanaka, used primarily in Myanmar as a traditional skin potion, is an extraordinary example of how one plant can be used for a variety of purposes.

3. Finally, various spices, plants and types of traditional recipients are provided for storage and pest mitigation. Each recipe is presented in a simple, easy-to-follow format.

Tables of Plants used in Textile Preservation in Southeast Asia

All the plant materials identified in the 11 country research projects are listed in the plant tables, amounting to **62 plants in total**. They are listed in alphabetical order, according to their scientific (Latin) name. The family, area of origin and current geographic distribution of each plant are included (wherever the information was available) so that interested users can try to find the plant, or a related one. Names in various Southeast Asian languages are included, if known. Missing names or information may indicate that a name exists in a local dialect not yet recorded, or that the plant exists in a remote region. The absence of a plant does not necessarily mean that the plant does not exist or is not used there. The table includes the location where the plant was recorded as being used as a traditional method, which part of the plant is used, and simple directions for use. The plants listed in these tables include extinct, dying and existing methods, and the same plant may be recorded as a method in multiple countries, especially if the climate is similar. The same plant may appear in more than one table (rice, coconut, betel) due to a difference in either its purpose, how it is prepared, or which part of the plant is used. There are five (5) tables in total:

Table 1: General Cleaning / Wet Cleaning (Saponins)
Plants containing saponin (a natural surfactant). Extracts of these plants are often mixed with water to release the naturally occurring saponin or soap, creating a natural foam.

Table 2: General Cleaning / Wet Cleaning (Others)
Plants that are traditionally used for wet cleaning, but do not contain saponin, or enough saponin to create a foamy lather. These cleaning plants are mostly used for their antibacterial and/or pest mitigation properties, rather than removing dirt from the fabric. For example, rinsed rice water, easily obtained, is a common cleaner.

Table 3: Stain Removal
Many of these plants are acidic, which helps to remove stains. In most cases, the method involves leaving the fruit or juice on the stain before rinsing.

Table 4: Storage and Pest Mitigation
These plants are often commonly used spices and aromatic herbs, such as pepper, cinnamon, clove, pandan, betel and patchouli. They are primarily used as barriers or deterrents and not applied directly to the textile.

Table 5: Miscellaneous Textile Treatments
These plants are used for very specific or multi-purpose uses, i.e. batik colour treatment or dry-cleaning. The use of "*ratus*" (a secret Indonesian blend of various herbs and spices) is used either as a smoking agent to "dry-clean" the fabric, or as stuffing in a cloth bag placed in the storage area.

The Science of Cleaning Textiles

This section serves as an introduction to scientific principles in textile conservation, and in particular the science of wet cleaning. Here, basic science supports and quantifies the traditional practice data collected by the contributing researchers. This important chapter contains the essentials that a conservator, collector or practitioner needs to know before, during and after the treatment process.

The Analysis of Saponin in Baimee Leaves, Soapnut Fruits and Fenugreek Seeds

A short scientific analysis of the content and properties of three plants identified as natural textile cleaners in Thailand. Please be advised that this section is intended for those who are well-versed in chemistry.

Appendices

The appendix includes additional details supporting the project, including lists of interviewees (listed by country), the participants/researchers in both the first and second textile conservation workshops led by SEAMEO SPAFA and QSMT, a scientific results table, a literature review, as well as a bibliography of supporting scientific research testifying to the properties of the plants.

Should you, the reader, know of any traditional plant or method that is not listed here, please contact us. We authors and researchers take pride in this project being an open, participative and collaborative endeavour. Thus, we consider the information contained herein as a preliminary basis for a wider and deeper investigation.

We hope you enjoy this book as much as we enjoyed making it (an ode to the wine-fuelled night making lerak/soapnut concentrate, with fruit residues all over our hair and brown stained fingers for the rest of the week!). We hope that this inspires curiosity, collaboration and investigation into the world of plant-based and ecological practices to promote its role in the field of conservation.

Two elderly Karen weavers with Linh Anh, editor and project coordinator, during the pilot research phase in Phrae Province, Thailand.
(Source: Queen Sirikit Museum of Textiles)

EXECUTIVE SUMMARY
of Country Reports and Findings

Where there is a long and storied history of textiles, there is a parallel history of conserving those textiles for present and future use. Using indigenous plants for textile conservation—their seeds, leaves, roots, bark, and juices—is a traditional practice supported by a wealth of knowledge that we risk losing if it is not captured and recorded. Diverse plants provided the elements of environmentally friendly detergents, preservatives and pest deterrents throughout Southeast Asia. Capturing the indigenous knowledge and identifying the relevant plants is the first step towards integrating these practices into modern textile conservation.

Over a period of three years and two workshops, thirty textile specialists and conservators from 10 Southeast Asian countries[1] engaged in fieldwork, documentation of traditional knowledge and methods of preservation, and the gathering of plant data and related treatment ingredients for analysis and testing. Herein is the first professional conservation effort to record the similarities and differences in traditional practices and materials used in textile preservation across Southeast Asia, with the intent of incorporating them into contemporary professional textile conservation methods. Each country report contains a wealth of information about local history, indigenous beliefs and practices and clearly defines what is retrospective and what is being practised today.

Elder Subi Nalon transmits the knowledge of producing and caring for *t'nalak* ikat-dyed *abacá* cloth to her daughter Ellen Duwang in Klubi, Lake Sebu, South Cotabato
(Source: National Museum of the Philippines)

This compilation is the first resource of its kind, with valuable cross-referencing of each plant to the comprehensive plant database in this publication. The traditional approaches and resources provide practical, often locally sustainable alternatives for conservation practices. Moreover, the intangible wisdom, inseparable from the tangible, directly support the preservation of the culture and bio-heritage of the communities. Since urban development and modernization is happening so rapidly in many countries, these reports are valuable benchmarks for future research.

1 Brunei Darussalam, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Vietnam

Azmiah Edy Sunarto, 49 years old, learned how to wash batik using lerak (soapnut) from her grandparents. Photographed here with curator and research Benny Gratha in Jakarta, Indonesia. (Source: Benny Gratha)

These two elderly Karen weavers were among the first informants interviewed during the pilot research phase in Phrae Province, Thailand, in October 2013. (Source: Queen Sirikit Museum of Textiles)

The reports are summaries of all of the data gathered, and thus, much data remains to be included in future studies and reports, such as information about dyeing, weaving and religious beliefs. Moreover, this is a representative survey study and subset of data, so it does not pretend to fully describe each country, its indigenous groups, and broader cultural values and practices as they relate to textiles and their conservation. The goal was to capture a basic understanding of how certain plants support textile conservation in the places where fieldwork was undertaken. The people who served as sources of traditional knowledge and practice come from a variety of backgrounds, including members of royalty, urban textile shop owners and collectors, commercial weavers, village dyers and weavers, and government personnel from museums and ministries of arts and culture.

All the researchers took enormous interest in the fieldwork, made great efforts to diversify the interviews, query deeply and explore the subject matter. This project obviously struck a chord with the young heritage and conservation specialists (authors of this publication) who care deeply about their own culture. In fact, our project was originally called “Before They Are Gone”. So, we are a part of a group of people who really care about the preservation of some important heritage that we can apply to our conservation practice. This publication gives the research and its participants validity in their institutions, and our combined data authority for the field of textile conservation and stewardship overall in Southeast Asia and beyond.

Qualified and curious research partners were identified and nominated to conduct research in their own country. Each country researcher was asked to interview up to 10 people individually, resulting in a total of 134 interviews. Each researcher received questionnaire templates for the interviews, a sample table of plants that might be or have been used in textile conservation, and a literature review. From the interviews, researchers amassed data about traditional plants used for preservation, and this information is compiled into the master table. In all, there are 62 plants cited; 18 as natural saponin detergents, 11 plants as no or low saponin detergents, 15 for stain removal, 16 for insect mitigation and 13 plants for miscellaneous uses (perfuming, yarn treatment, colour enhancement).

The most striking general conclusion is how few traditional methods are in practice today, and yet, at the same time, how many old methods are readily remembered. Much of the data refers to bygone practices recalled in “retrospective interviews”.

In almost every country, the recollected data is no more than one generation past. Singapore is the exception; it is three generations bygone. Where traditionally used plant materials are extinct, or largely unavailable, they have been lost to modernization in one form or another, including massive land development and overuse of natural resources. The most predictable result of the study was the direct relationship between the loss of wealth of traditional knowledge and practice and the extent of “westernization” and consumerism of a given country or region.

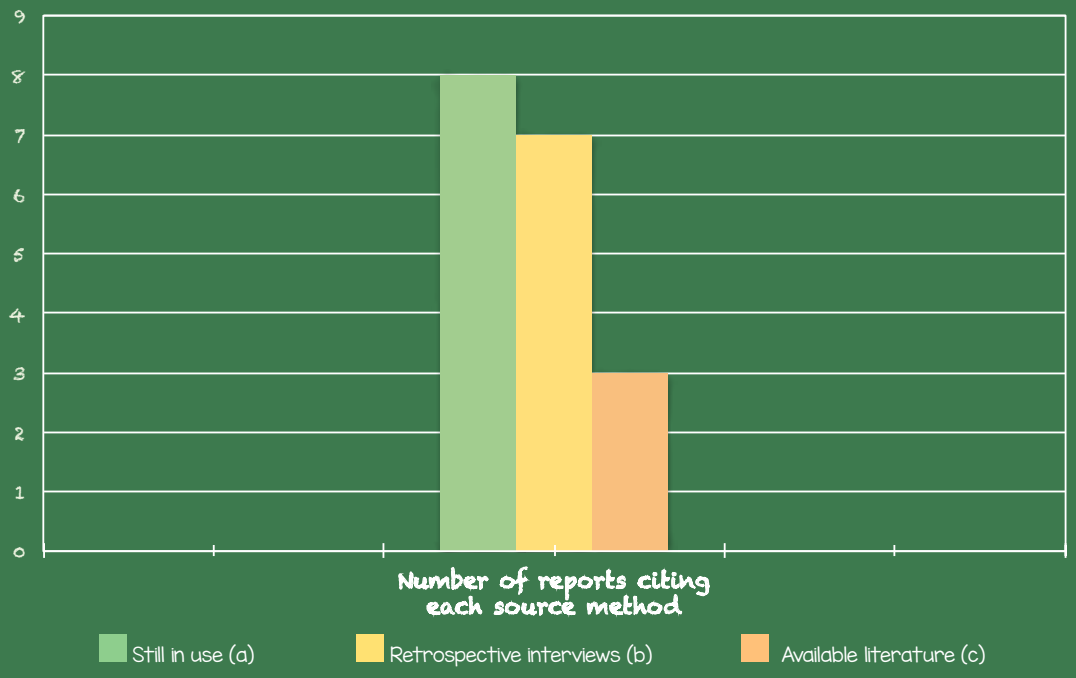
JULIA M BRENNAN

Conservation Department
Queen Sirikit Museum of Textiles, Bangkok, Thailand

Julia M. Brennan has worked in the field of textile conservation for over thirty years. Caring for Textiles, her company, was founded in 1996 and is based in Washington DC. She does a full range of textile treatments, display, installations, storage and survey work for institutions and private clients.

Julia's advocacy for preservation outreach has taken her back to Southeast Asia, a most beloved region, where she grew up. From 2000 to 2008, she led multiple textile preservation workshops in Bhutan and helped establish the National Textile Museum. Since 2008, she has been training a new generation of textile conservators in Thailand, at the Queen Sirikit Museum of Textiles in Bangkok, and leading preservation trainings in Indonesia, Taiwan and Rwanda. Julia Brennan is a Professional Associate of the American Institute for Conservation and an active member of ICOM-CC Textiles Working Group, IIC, the Washington Conservation Guild, APTCCARN and Collections Care Network (CCN).

Chart 1: Sources of Data Obtained on Traditional Practices

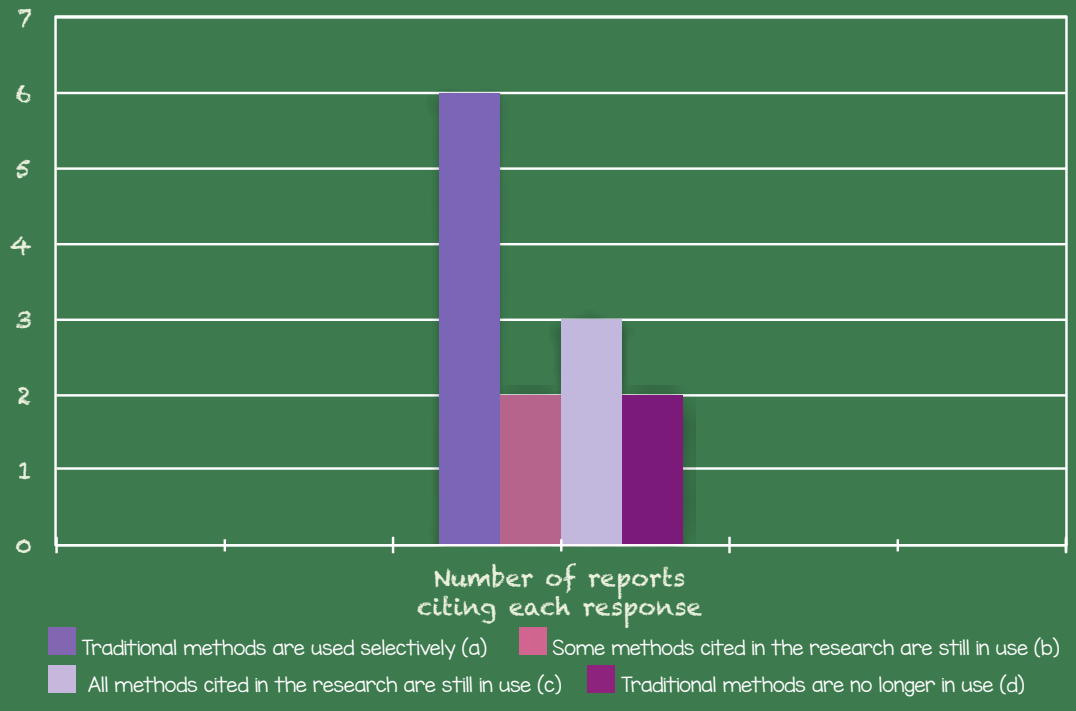


(a) Brunei Darussalam, Indonesia (Java), Indonesia (Bali), Laos, Malaysia, Myanmar, Philippines, Timor-Leste

(b) Brunei Darussalam, Indonesia (Bali), Laos, Malaysia, Singapore, Thailand, Vietnam

(c) Indonesia (Bali), Singapore, Timor-Leste

Chart 2: Present Use of Traditional Textile Treatment Methods



(a) Brunei Darussalam, Indonesia (Bali), Laos, Malaysia, Philippines, Vietnam

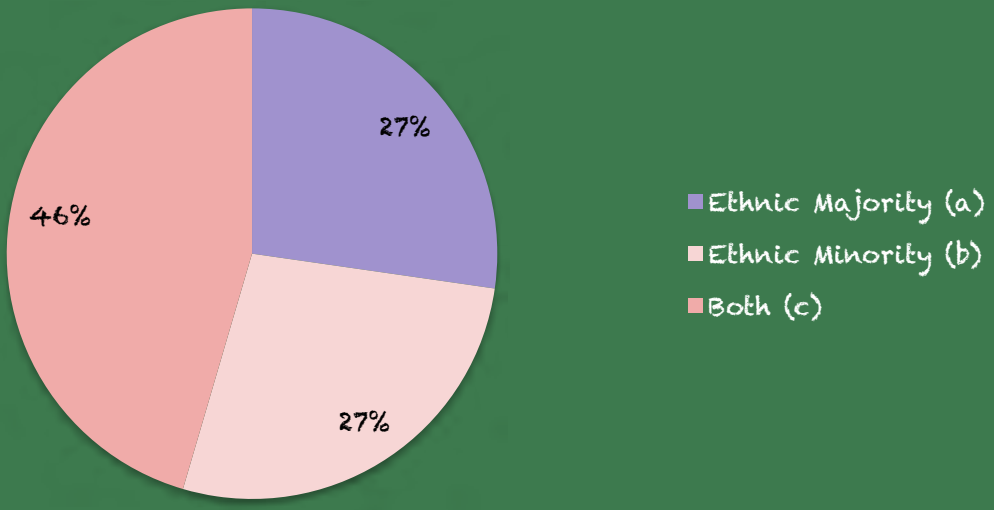
(b) Indonesia (Bali), Malaysia

(c) Indonesia (Java), Myanmar, Timor-Leste

(d) Singapore, Thailand

It is unsurprising then that where traditional practices are in use, it is by tribal or “minority” groups, often in mountainous regions, and isolated from mass consumerism or currency. Myanmar, Philippines and Timor-Leste provide the richest opportunities to witness living traditional practices and materials. In Myanmar, a unique plant-based stain remover, known as thanaka, stands out as a widely available material used for a variety of purposes. . In Timor-Leste, hand cultivation, hand spinning and the use of plant-based natural dyeing is the sole textile production. In the Philippines, there are distinct regions with traditional cloth production, and preservation methods are rigorously practised.

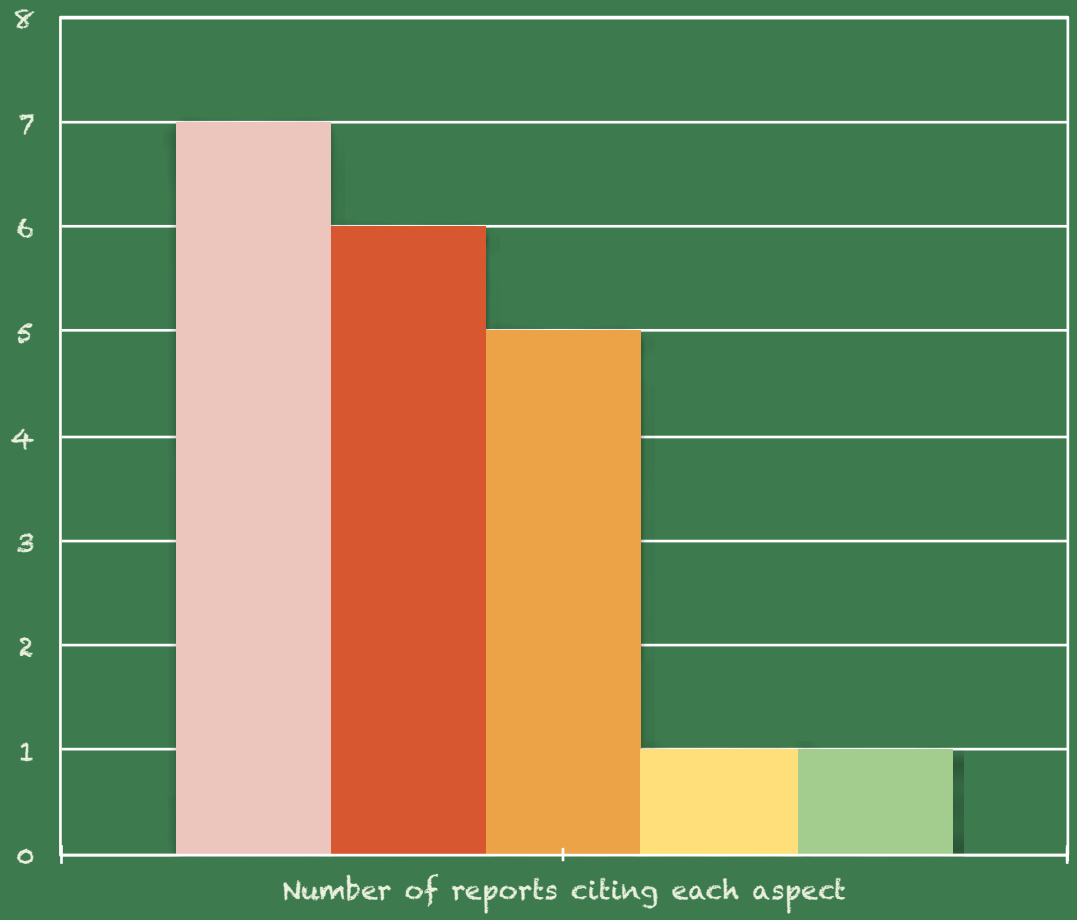
Chart 3: Ethnographic Provenance of Data



(a) Indonesia (Bali), Laos, Malaysia
(b) Brunei Darussalam, Vietnam, Timor-Leste
(c) Indonesia (Java), Myanmar, Philippines, Singapore, Thailand

While using these traditional materials and techniques for practical reasons, these cultures also are more imbued with spiritual beliefs that connect to the work than cultures with less active traditional textile practices, or practices that have evolved with a modern, more global framework and materials. Where tradition is strong, the practice can be traced back centuries.

Chart 4: Spiritual Beliefs Related to Textiles



(a) Indonesia (Bali), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam

(b) Indonesia (Bali), Laos, Malaysia, Philippines, Thailand, Vietnam

(c) Indonesia (Bali), Laos, Malaysia, Philippines, Thailand

(d) Brunei Darussalam

(e) Singapore

Researcher Claudio Marques Cabral takes notes and assistant Fernando Sousa Lay observes a weaver in Lautem District, Timor-Leste

(Source: National Directorate of Museum, State Secretariat for Arts and Culture, Timor-Leste)

TIMOR LESTE, a largely rural, un-industrialized country, is the most connected to the land for food, trade, clothing, farming and ceremonies. There are **no** generations separating the traditional knowledge from its practice. Spiritual beliefs are fully intertwined with traditional practices, as Joao Muniz, age 76, traditional speaker, clarifies: "The beliefs which are associated with the traditional knowledge is the tradition itself." Strongly connected to their ancient origins, these stories are painted in the prehistoric cave art of Kere Kere and duplicated in the textiles. Timor-Leste is the **only example** in this study where textile motifs can be directly linked to a local prehistoric art site, connecting the creativity, meaning and expression. As a traditional dance teacher, Olinda Moniz echoed, "All the things which are *sophisticated* right now are based from ancestor." (Author's note: The meaning of "sophisticated" may denote "cultured", "refined" or "superior".) There is deep appreciation for the spirit of the owners of the earth and heaven for always providing goodness in preserving the cultural heritage. The Timor-Leste report included additional data on spiritual beliefs, natural dyeing and cloth production.

MYANMAR is on the cusp of huge societal and economic change, with the introduction of mass tourism, the increase of infrastructure and manufacturing, and all the influences that accompany this kind of change. Yet, it has a rich assortment of traditional plant materials still in use for textile, home and personal cleaning (according to data gathered in both Workshops 1 and 2). The traditional material that really stands out is the use of thanaka. The source tree is unique to Myanmar. The whitish paste made from it has been used for centuries to coat the face for both protection from the elements and as a sign of beauty. It is a sort of magic potion used for everything, from skin ailments to stain removal, and its use is clearly NOT waning. The thanaka was introduced into this traditional textile preservation data as a **stain remover**; the paste, applied directly to blemished cloth, can have a miraculous reducing effect. Initial testing on both polar and non-polar stains shows that it has enormous promise in local stain removal applications. Continued testing is called for before endorsing it in the conservation "toolbox".

From a traditional knowledge perspective, it is fortunate that the historic Saunders Weaving and Vocational Institute is vibrant and growing. They have 14 centres around the country, dedicated to teaching traditional textile production. Their programme has expanded to include the revival of nearly obsolete natural dyes for fabrics, which are selling well to the Japanese and export market. The Institute leaders are adaptable and aware of the need to capture and embrace traditional knowledge and skills to train the next generation.

PHILIPPINES – this vast archipelago with a huge range of socio-economic standards is a micro-study in sustainability. The country is characterized by a strong living culture of traditional textile production and associated practices. One reason is the status of the *piña*, or pineapple fibre cloth; it is the 'national dress', often worn as ceremonial attire for weddings and special occasions. From middle class to high society, locals and the diaspora, there is huge demand for the enormously elaborate pieces of embroidered *piña*. It goes without saying that if a country or region is producing handmade traditional textiles, the weavers and dyers know their craft, their science and the best methods for cleaning, stain removal and long-term care. There is a connection between maker and consumer. In the Philippines, they set the standards and guidelines, informing the consumer. They are accessible and this study chronicles them beautifully.

The other noteworthy piece of data cited in the Philippines report is the use of various plant substances during the production process, to strengthen the fibres, protect them from insects or keep them smooth and clean. **So here, there are 'built-in" preventative conservation measures at work, practised since ancient times, to better preserve textiles.** There appears to be remarkable continuity in knowledge and skills being passed down from one generation to the next; a model for conservation practices. Another direct conservation crossover is the common use of *abacá* fibre. In the Philippines, it is used as a woven fibre in textile conservation to wrap, pad and protect delicate textiles. It has a neutral pH and is quite costly, at US$ 1.50 per sheet.

SINGAPORE, which lies on the other end of the spectrum, has no living connections to these traditions. It is a completely modern metropolis, with great societal changes starting in the 1950s. Therefore, over the past 70-year period and three generations, everyone has adapted to modern ways and perceived conveniences—thus, the more time consuming traditional practices are obsolete. It is all now historic data, not living practice, and sequestered in ethnographic studies. It is fortunate that the Heritage Conservation Centre collaborated in this research, being the nation's repository for much of the traditional knowledge and practice that has been overtaken by the urbanized modern Singapore. The Singapore country report author was the only researcher who conducted her own polar and non-polar stain removal and wet cleaning tests, using home remedies from bygone days. Two examples in the report do provide an unusual insight into older practices. The legendary Indian immigrant dhobi laundry is a story of Singapore history, and continues today albeit fully mechanized. And a knowledgeable elderly Peranakan (Chinese Malay origin) man recalls many "old world" methods and plants used by his mother and grandmother in the preservation of their fine textiles, including papaya leaf, another saponin. These traditional methods are much like those from neighbouring Indonesia and Malaysia, including the *ratus* or dry-cleaning, and the use of various leaves as soaps.

More than 60% of the countries do utilize at least two traditional textile care methods, albeit herbal insect repellents. This includes Indonesia, Laos, Malaysia, Myanmar, Laos, Philippines, Thailand, Timor-Leste, Vietnam. However, only two countries – Indonesia and Malaysia – have a robust continuous use of a traditional plant method for the wet-cleaning and dry-cleaning of textiles.

INDONESIA – this huge archipelago has more than a thousand populated islands and an incredibly diverse array of plants and human communities. The country report looked at practices on the most populous island, **JAVA**, home to a rich textile tradition, and in **BALI**. The use of *lerak* (soapnut) is the most notable and prevalent of the traditional practices in current use and, in fact, its popularity in Java is spreading to other countries in Southeast Asia. The fruit is a natural saponin surfactant from the soapnut tree, *Sapindus rarak*, native to most of Southeast Asia. But **in Java it has been the detergent of choice for washing batiks, the staple cloth of Java, since time immemorial**. Like the traditional production of *piña* in the Philippines, and the methods to care for it, fine Javanese batiks have had an associated traditional method of care and cleaning using *lerak*.

Vetiver roots burning in the smoking process to repel insects.
(Source: Benny Gratha)

The research in **BALI** revealed a common strongly held value in local Balinese culture: For people to preserve, value and protect "all things Balinese" (Ajeg Bali, "Let Bali Stand Strong" movement). The many conversations with interviewees concurred that the finest *ikat* and brocade textiles in fact are not washed. They are rare and valued, and therefore aired out – avoiding the risk of washing them. The Balinese are clearly aware of the delicacy of the fabrics. This is the only country study that **completely committed** to the proposition that "washing is not an option"; it has no other form of preventive care strategy in place.

MALAYSIA and Indonesia share the same historic crossroads of trade and therefore developed sophisticated methods to preserve fine silks and cottons. They share several plant recipes for stain removal and washing, such as bilimbi, burnt ash and citronella. Today, they both practise the method of perfuming or smoking textiles with *ratus* to "dry-clean", eliminate mould and mildew, prevent insect damage and dry out. Almost all the interviewees from both countries cited it. The *ratus*, an incense-like cake that is burnt to create the smoke, is made of secret mixtures of herbs and spices, such as clove, nutmeg, cinnamon, sandalwood, vetiver. Where it originated is uncertain, but it was done in the courts or *kratons* of Java, to preserve the finest cloths and perfume the princesses and courtesans. Here there is a parallel with the court of Siam, where research revealed a vast array of herbs, spices and flowers used in smoking and distillations to "preserve" the textiles and enhance the wearer. These were not just any spices; these were enormously exclusive. Among the textiles most often preserved with *ratus* are *songket*, the costly, metallic and silk status pieces. The gold and silver threads, often gilded, pose a risk for any method of wet cleaning. Thus, this PASSIVE procedure, which is insecticidal, antifungal, antibacterial, and smells divine, is **a truly moderate conservation practice. It features a preventive conservation approach and is still widely practised**.

BRUNEI shares some textile, cultural and religious traditions with Indonesia and Malaysia. Brunei tradition also makes a specific point of addressing the problematic topic of cleaning and storing *songket*. Like its neighbours, it uses the *ratus* smoking method. While the data and research was limited for Brunei, the interview with Iban tribal elders reveals that traditional weaving is part of daily and ritual life. Here, the beliefs, as well as storage and cleaning practices, follow age-old traditions. Cloths are stored near household cooking fires to keep them dry and insect and mould free. Further, the cloths are aired periodically in the sun to prevent mould, and storage is in a traditional *tajau* vase, which is cold, slippery, dark and unfriendly to insects. This is similar to the use of sealed clay pots in Laos, Cambodia and northeast Thailand to store ritual textiles.

All **other cleaners and stain removers** cited in the data are used selectively, and it is difficult to quantify. By and large, everywhere, even in the hills of Laos or Myanmar, people use modern chemical detergents and cake soaps, or laundry machines for washing, or they do not wash at all. It is striking that 75% of interviewees across the region **do not wet-clean** any special, ritual, silk or metallic textiles, using airing as their only method. Such is the wisdom of the elders. Wet-cleaning could cause dye bleeds, thread abrasion, oxidation of metals and additional wear-and-tear beyond ritual use.

This risk, or any risk, was not permissible. Therefore, it appears that how to take care of and treasure textiles, treating them very cautiously (as we conservators do today), is embedded in common cultural knowledge. In turn, so is conveying that cautious approach to the next generations. This awareness and practice of NO CLEANING continues across the studied geographies – Bali, Java, Malaysia, Brunei, Laos, Thailand, Vietnam and Timor-Leste.

Malaysia, Thailand, Laos, Vietnam and Indonesia straddle the middle as nations with semi-healthy agrarian cultures, and aggressive and progressive modern urban societies[2]. Here, the efficiency of commercial detergents long ago infiltrated rural daily life, rendering traditional plant-based cleaners obsolete. One exception is the pervasive use of the saponin-rich soapnut fruit, or *lerak*, to wash hand-drawn cotton batik by many Indonesians and Malaysians. In general, the only traditional practices that remain in these modern societies are ones that have not (yet) been replaced by readily available chemical solutions or that remain substantially more accessible and less expensive.

LAOS, like Thailand, Myanmar, Malaysia, Indonesia, Vietnam, is strongly influenced by outside fashions and advertising. The younger generations and successful upper class are anxious to look more pan-Asian and non-traditional. Yet, Laotian textile use is still deeply traditional; women in government offices, school, temples and official meetings have a dress code of the *sinh*, the tubular skirt and blouse. Even in cities, women continue to wear *sinh*, on the motorbike, with children sitting front and back, and holding a parasol. Many Lao women can identify the ethnic group of each *sinh* and engage in quality and excellence comparison, as they are considered status possessions. This is especially true in rural areas, where tribal groups and their customs still predominate.

In urban areas, as the researcher found, the awareness of traditional textile preservation techniques is about past practices, "recollected" by the informants. The remaining old-world methods for cleaning and caring for textiles include the simplest, most cautious cleaning methods – like plain water and air-drying as reflected in this telling adage of rural women: **"The morning sun is a textile's best friend."**

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2 As do the Philippines but the relevant data is not included in its country report.

The country report author, herself a weaver and designer, actively promotes traditional Lao textiles, but cautions that the young generation has little understanding of them and their spiritual significance. They wear them but without a vested interest in ensuring their own specific understanding of, or connection to, a specific *sinh* or other tradition. She can see these textiles headed for the historic graveyard, enshrined in museums as past practices, and the traditional methods of cleaning and preserving along with them.

VIETNAM seems caught in a similar rush to commodification and consumerism, obliterating traditional skills. The exception is the hill tribes, who continue to practise traditional textile production. However, this demographic was not the focus of this research and deserves further study. Like its Asian neighbours, Vietnam thrives on efficiency, and time-consuming old world methods are not compelling. However, an emerging sector of urban consumers are fascinated by some of the natural methods for use in the home and healthcare. For example, there is real interest in the use of **ash water for washing white or light coloured textiles**. The country report author provides an excellent step-by-step sequence for using this method of saponin cleaning, as used by the Tai people in Thanh Hoa province.

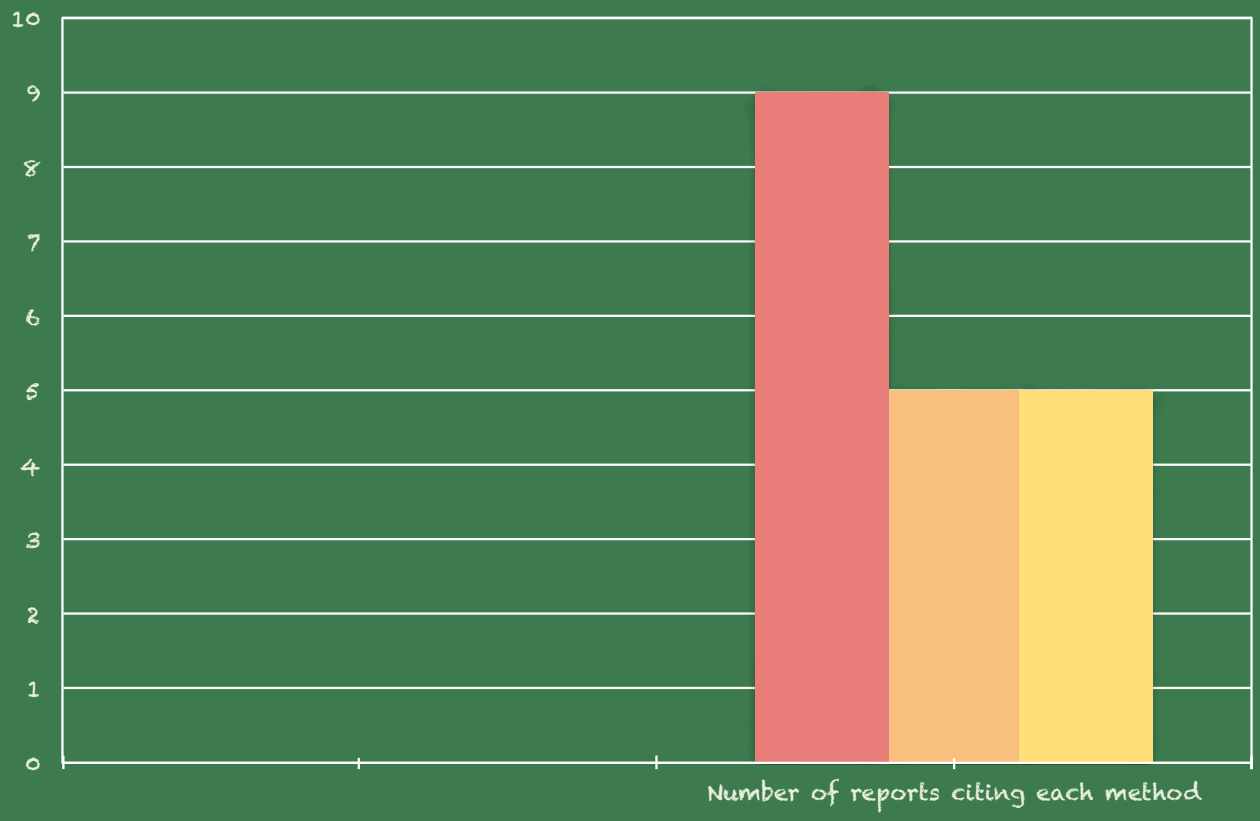
THAILAND is both rural and urban, yet it is predominantly a consumer-oriented, mass technology culture. Seventy years of stability, economic development and industrialization have pretty much eliminated all use of traditional plants in the care of textiles. Like Laos and Vietnam, most of the women are neither using traditional knowledge in their preservation practices nor those of their mothers or grandmothers, and data was gathered from "retrospective interviews". Several elderly women and, surprisingly, two younger men have been making efforts to return to these practices in weaving and dyeing as well as in traditional cleaning and care. Interviewees cited success with these tried-and-true herbs and practices, and so there is still a chance that a younger generation can be taught how to use these artisanal methods.

Nut, then 17 years old, showing researchers his dyeing "office" overlooking a rice field in Phrae Province, Thailand, in October 2013. (Source: Queen Sirikit Museum of Textiles)

Essentially, in all these modern Southeast Asian countries, most traditional practices are obsolete, except for herbal and lime "one offs", which are easy to use, cheap, "kitchen wisdom" remedies. Thus, the use of lime or vinegar to remove a textile stain is widely practised. For insect mitigation, traditional practices survive in 70% of the countries, as herbal products are affordable and readily available. The use of cloves, *pandan* leaves, peppercorns, citronella or tobacco leaves are more prevalent than mothballs or other chemical insecticides.

Here the exception is in museum settings, where custodians have been trained and encouraged to use western methods. Hence, in a majority of the data cited from Southeast Asian museums, mothballs are a pervasive form of insect control in institutions. They were introduced and modelled long ago (even in early 1900s) by foreign business people, missionaries, medical teams, Foreign Service, as the common "go-to" solution for insect infestations and a cheap alternative to herbal remedies. While the present day formula has changed, they are still a health risk and **not effective** in the elimination of insects. In many countries with strict government health and safety standards, mothballs are rarely in use, and certainly not in museums.

Chart 5: Pest Mitigation Methods



- Plants / herbs / spices, either fresh, dried, steamed or smoked (a)
- Mothball / naphthalene (b)
- Pest-deterring storage conditions (c)

(a) Indonesia (Java), Indonesia (Bali), Laos, Malaysia, Philippines, Singapore (no longer practised but reported), Thailand, Timor-Leste, Vietnam

(b) Brunei Darussalam, Malaysia, Myanmar, Philippines, Thailand

(c) Laos, Malaysia, Thailand, Timor-Leste, Vietnam

Conclusion

The recording and use of traditional plant-based methods of cleaning and protecting textiles do not just preserve cultural heritage for its own sake. The methods revealed herein and the production of the necessary plants represent an opportunity to improve the sustainability of modern textile conservation practices and to support continuity of successful traditional practices in societies increasingly separated from their cultural heritage. How to broaden the awareness and use of traditional textile conservation methods is one question. Another is how we ensure that this initial study supports additional work to ensure that other traditional treatments (and the plants that support them) are duly recorded and understood, particularly in rapidly changing regions such as Southeast Asia.

A form of "farm to table" approach among Southeast Asia's urban elite could be tapped as savvy consumers search for sustainable and healthy solutions for the planet and themselves. The traditional plant-based methods do fit into growing cultural trends that seek sustainability, simple solutions, the human touch (handmade) and greater respect for the earth. Real opportunities lie in Indonesia, Malaysia, Myanmar and Vietnam to connect rural traditions to urban dwellers for their mutual benefit. Likewise, textile conservation can be enhanced by further use of plant-based materials. The Philippines has already offered one example of an indigenous fibre that has made it into mainstream conservation practice: abacá fibre tissue. Being neutral pH and very fine, it is used extensively for both textile and print preservation around the world.

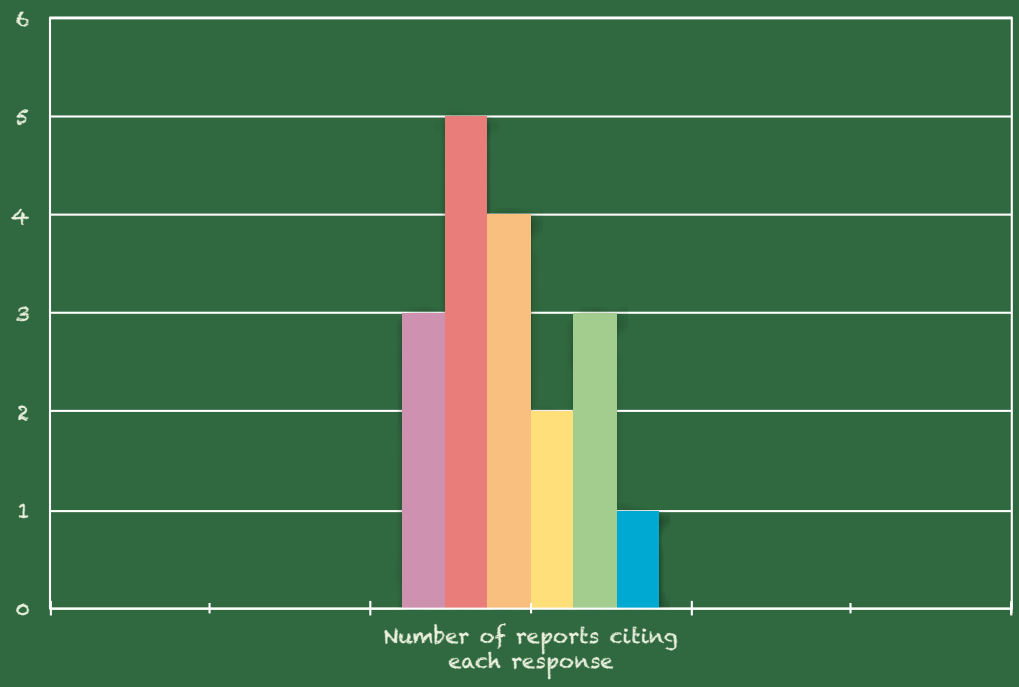
In some cases, a plant material traditionally used for textile cleaning has been "re-discovered" by pharmaceutical or cosmetic companies and is now becoming a "crossover" material, formulated and promoted for a different use, such as personal beauty care, as the next "miracle" cream or cleaner. The revival of bồ kết in Vietnam as a luxurious hair shampoo or lerak as a mass-produced batik and textile cleaner are two examples. Thanaka, the paste from a wood indigenous to Myanmar, is becoming the "hot" natural ingredient in cosmetics and skin products.

In countries such as Thailand, more than three quarters of the interviewees use no traditional practices in their textile conservation work. At the same time, the use of natural products is emerging in the entrepreneurial, "hipster" market, supporting the desire for artisanal and natural products. Turmeric, fenugreek, charcoal, mangosteen and kaffir lime are some of the plant materials in current product lines—which may offer a path forward to re-integration of traditional practice in textile conservation. The Philippines country report also mentioned that one of the criteria that informs the use of traditional methods is that of health and safety. The traditional method is used because it's safer for people and the environment. That's an important element that can also be used as a pathway towards broader use of the traditional plants and practices in textile conservation.

Broader cultural values also emerged from the country reports. In general, there is considerable cultural pride in rich textile heritage, indicated in part by an increasing interest from private collectors and public museums. These values shape awareness of the methods of care for special textiles, as well as an interest in learning better practices for the long term care of fine textile heritage. For example, there is a clear distinction between daily clothes and those rare and exceptional cloths and how they are cared for, and the importance attached to them. These values were strongly reinforced by many sources from the weaving and collecting sectors.

Finally, the fieldwork and research heightened the individual researcher's interest in and awareness of everyone's shared textile heritage and the value of the traditional methods and use of plants that are not yet forgotten. Researchers were truly astonished at how much they learned sitting with elders and other sources talking about textiles, their care and shared local heritage of tradition and belief. Sometimes the simplest "fact" was the most salient, such as "No cleaning!" These are their stories and accounts.

Chart 6: The Present and Future of Plant-based Traditional Methods



6.a. Examples of current use of traditional methods

- Revival in household care:
  - Indonesia: Bali Soap sells machine-washable bags filled with dried soapnuts to put in the laundry machine with your fabrics.
  - Thailand: Pipper Standard sells a line of household care products made from fermented pineapple and other plant-based ingredients.
- Revival in cosmetics:
  - Various commercial initiatives (i.e. Siam Botanicals and Soap Villa in Thailand; Utama Spice in Bali) use 100% plant-based traditional ingredients in their soaps and shampoos.
  - Increasing international attention on Burmese thanaka in skincare.
- "Cross-overs" between traditional and industrial methods:
  - Indonesia: Batik Attack made with soapnut/lerak
  - Thailand: Fenugreek, turmeric, mangosteen, charcoal, citronella are among many herbs and plants being infused into shampoo, cream, soaps and cosmetics, i.e. Babi Mild soapnut fabric wash, Protex bar soap with tamarind/turmeric
  - Malaysia: Sabun Bidara
  - Vietnam: Sunsilk Bo Ket

COUNTRY REPORTS

SITI NORHAYATTY BINTI HAJI MORNI

Scientific Officer, Conservation Section
Brunei Museums Department

Yatty graduated with a Bachelor of Science (Hon.) in Environmental Health from the University of Wales Institute and a Master of Science in Conservation Biology from the University of Kent, with knowledge in addressing issues related to risk assessment and biodiversity conservation. In 2005, she joined the Brunei Museums Department as Scientific Officer, working in the conservation and restoration of collections in storage and exhibition galleries. She has had the opportunity to participate in various international workshops and courses organized by UNESCO and ICCROM-SEAMEO SPAFA (CollAsia).

AZIAH BINTI HAJI AHMAD

Conservation Officer
Brunei Museums Department

Aziah graduated from Maktab Melayu Paduka Seri Begawan Sultan Science School in 1983. She soon started working at the Brunei Museums Department's Natural History Section in 1985 where she was responsible for establishing the Brunei Museum's shell collection and for collecting data on seashore life. This endeavour resulted in a book that she co-wrote in 1997 entitled "Common Seashore Life of Brunei". She joined the Conservation and Restoration Section in 2004 and was promoted to Conservation Officer in 2009. She was then appointed Head of Organic Laboratory Unit where she handled the conservation of cultural wooden and textile materials. She has participated in international workshops and trainings in various fields of conservation and emergency response and recovery in Brunei, Singapore, Malaysia and the Philippines, as well as SEAMEO SPAFA-QSMT's two textile conservation activities in 2012 and in 2016.

BRUNEI DARUSSALAM

Siti Norhayatty binti Haji Morni
Aziah binti Haji Ahmad

Introduction

Historically, traditional textiles have been an important part of the culture of the Malays, and the handweaving traditions of Brunei have helped to establish and define its national identity. Traditional textiles have an important role in Brunei society for ceremonial purposes, such as weddings. Moreover, handweaving, which is done by women, is a source of income, status and community identity in Brunei Darussalam. Traditionally, textile skills and weaving expertise are passed from elder women to the younger generation. The local government has launched a training facility, the Brunei Arts and Training Centre, in the capital where trained teachers mentor and teach the younger generations in both hands-on skills and curriculum modules. Here, tourists are able to observe traditional craftsmanship including basketry, weaving, silver, bronze and brass work, jewellery making, wood carving and the weaving of traditional textiles or "*kain tenunan*". In addition, the Brunei government has established museums, which collect and feature traditional crafts, including textiles.

Methodology

The Conservation Section of the Brunei Museums Department was established in 1988 and is responsible for conserving, preserving, restoring and caring for the cultural heritage in the collections of the Brunei Museums Department at large. As a museum conservation department that assists with preservation in many museums, the methodology used in this study was to observe and interview colleagues and associated craftspeople through the museum network. This included Rumah Panjang Mendaram Besar, a longhouse belonging to the Iban tribe of Borneo with one hundred occupants, located in the interior of Kampong Labi in the Belait District.

Part of the research was to examine our own conservation department's practices, as a benchmark for comparison with the methods of practising interviewees.

Conservation building of the Brunei Museums Department in Bandar Seri Begawan, Brunei Darussalam (Source: Brunei Museums Department)

Museums Department

In the Conservation Section, wet-cleaning using detergents has always been avoided. Cleaning methods, including stain removal with Vulpex spirit solvent, has been used on rare occasions to clean some traditional textiles. As a general rule, surface cleaning is the only method used in textile cleaning, using a special museum vacuum cleaner equipped with a soft brush head and protective net mesh. When done regularly in the collections, both in storage and exhibit, this method successfully removes dirt from the textile and reduces the problems associated with dirt, insects and other environmental damages.

Case Study: Iban Tribe, Ulu Mendaram

Researchers from the Brunei Museums Department's Conservation, Ethnology and Acquisition sections conducted a study in an Iban tribe longhouse, called Rumah Panjang Mendaram Besar, located in the interior of Kampong Labi in the Belait District. The 12-door longhouse has 100 occupants. Information was collected through interviews with the elderly on how weaving methods are being practised.

Research focused in particular on the *Pua Kumbu* or *Karap*. *Pua Kumbu*, an Iban weaving tradition which is passed from generation to generation, and regarded as a source of pride among the Iban community. This ceremonial cloth is approximately 250 cm long and 120 cm wide and is woven by an expert and elderly weaver. The *Pua Kumbu* are worn as signs of wealth and status and are vital for ceremonies and festivals, such as the Gawai Dayak festival, and rituals related to marriage, the birth of a child, the treatment of illness and death. Before weaving, it is believed that the elderly weavers must perform a spiritual rite of passage in order to avoid bad luck for the weavers and also the textile. In addition, certain stages in the weaving process, including starting the weaving, must be done by the chief weaver.

Rumah Panjang Mendaram Besar, an Iban tribe longhouse, Kampong Labi, Belait District, Brunei Darussalam. (Source: Brunei Museums Department)

In the past traditional weavings such as the *Pua Kumbu* were preserved by placing the textile in cabinets or big jars called *tajau*. Whilst these big *tajau* jars are of Chinese origin, they are considered as valuable heirlooms among the Iban. The *tajau*, made of clay, prevented rodents or pests from attacking the textiles. The *tajau* vase storage method is an historic practice as it is slippery and thus inhibits the rodents from entering. In addition to storing Iban weavings, the *tajau* is a multipurpose storage vase that can be used to keep dry foods such as rice, salt and flour.

Once a year, fine textiles are dried in the sun for about one hour. This age-old method is still practised today, in order to avoid humidity associated problems such as fungus or mould growing on the textiles. In the past, there were no commercial detergents available

to the Iban owners of the *Pua Kumbu*, so plants such as the two saponins *Securidaca inappendiculata* (Table 1) and *Ziziphus mauritiana* (Indian jujube, Table 1, known locally as "bidara") were used to make natural soaps for washing (in Malaysia, a product called "*Sabun bidara*" is promoted as a bodywash). The leaves were crushed or ground into water creating a foam or suds, which were rubbed gently onto the textile as a deep cleaning method.

Another method to preserve basketry and textiles from insects and mould is to place them in the kitchen near a stove or fire. The smoke from cooking will help to prevent pest and rodents from attacking the traditional basketry and other fibres.

Iban weavings of Rumah Panjang Mendaram Besar, the Iban tribe longhouse where the research was conducted.
(Source: Brunei Museums Department)

Conclusion

Brunei is rich in textile traditions and fine handwoven textiles. More research and government workshops need to be done with rural communities and elderly weavers in order to tell a broader historical and present-day story about the care of textile heritage.

Bidara leaves (Indian jujube, *Ziziphus mauritiana*), a saponin used to make natural soap.
(Source: Brunei Museums Department)

Left to right: Berika Anak Teliang, senior weaver, and Rayadiah Anak Ngawat of the Iban longhouse with Siti Norhayatty binti Haji Morni (Yatty), author/researcher of the Brunei Museums Department.
(Source: Brunei Museums Department)

Tajau vase at the Iban longhouse in Labi, Brunei Darussalam, resting atop a woven Iban floor mat. It is a multipurpose traditional container used to store Iban weavings and dry foods. The one pictured here is a relatively small version of the *tajau* with a simple design motif, though larger ones with animal and flower designs are also used.

BENNY GRATHA
Assistant Curator
Museum Tekstil Jakarta

Benny Gratha is an Assistant Curator volunteer at the Museum Tekstil Jakarta. He has been a regular volunteer since 2005. He studied Marine Science and Technology at Bogor Agricultural University, but has always had a strong interest in traditional textiles. He assists with exhibition activities and museum research. Currently, he manages textile cataloguing projects for private collectors.

He has played an instrumental role in various international programmes, i.e. “Curating Batik Collections in Asia and Europe” (Weltmuseum Vienna, Austria; Naprstek Museum Prague, Czech Republic; and Museum der Kulturen Basel, Switzerland) in September 2015 and “Textile Conservation Workshop of the Iwan Tirta Collection of Historic Batiks”, a collaborative project between the Museum Tekstil Jakarta and the US Embassy to Indonesia in April-May 2015. He has also published several works on Indonesian traditional textiles for the Museum Tekstil Jakarta.

INDONESIA (JAVA)

Benny Gratha

Introduction

Indonesia, renowned for its historic textiles, is a vast archipelago where traditional textiles have always been an important part of life. The techniques, methods, dyes and fibres are as varied as the islands, and in many areas continue to be a primary means of income and required for ceremonial use. Given these functions, many prized textiles are kept as family heirlooms, always carefully treated and preserved. The hot and humid tropical climate is a constant threat to these organic and susceptible fabrics, and therefore our wise ancestors developed special techniques to preserve traditional textiles.

Methodology

The research presented herein focuses on a small geographic area and mostly on the preservation methods for batik and Javanese textiles. It is but a tiny portion of the textile traditions of Indonesia and by no means representative of a national study. The interviews took place in Jakarta and its vicinity (Depok, Bekasi and Banten). The interviewees were selected from these areas and also from Yogyakarta in central Java, in order to provide an overview of practices and traditions from the island of Java. Interviewees from other islands, such as Bali, Sumatra (Jambi) and Flores (Ende), were selected and included for their expert knowledge and wisdom of Indonesian textiles in general. The professions of the interviewees varied; among others are batik artists, dyer, ikat designer, educator, collector, textile enthusiast, connoisseur and textile conservator. The ages range between 33 and 81 years old. In addition, printed data was consulted, including journals, research and scientific works, and publications obtained from library and online resources.

Batik

Batik, synonymous with Java, is a resist dyed or printed cotton; lightweight, flexible and used as daily wear widely throughout the archipelago. Batik also has rare motifs reserved for special occasions by the Javanese; some motifs are believed to cure sickness, because each line and dot drawn onto the fabric is a coded message of sincere hope to bring wellness and happiness. In some cases, batik artists perform rituals before starting the process, such as meditation and fasting to give a “soul” to the cloth. Javanese also believe that old and antique batiks, especially those inherited from ancestors, possess a “spirit” of peace, prosperity and protection of the owner from bad spirits. In this way, the Javanese actively preserve batik traditions, beliefs, and, in so doing, preserve the physical cloth.

Dried *lerak* fruits, the older generation of bottled *lerak* detergent (left) and the newer "Batik Attack" (right). (Source: Benny Gratha)

Since many batik are worn as a daily cloth in the tropics, they are regularly cleaned. They are made of fine quality cotton and known to wash well. One elderly batik maker recounted how she takes her antique collection out of the boxes and protective bags twice a year and gently washes them and dries them in a well-ventilated space. The Javanese have been using *lerak* (soapnut / *Sapindus rarak*, Table 1) as the soap for washing batik cloth since ancient times. Due to the presence of saponin, *lerak* is well known as a detergent. Every older Javanese woman knows how to prepare a *lerak* bath and carefully clean her batiks, and the fruits are sold in all the vegetable and traditional markets. She also knows that it is a gentle surfactant, easy to rinse out, and will not abrade or damage the cloth as a commercial detergent will. Today, the use of *lerak* continues widely with large companies formulating and selling it in easy-to-use bottles. Many batik shops and vendors sell *lerak* products such as "Batik Attack", which contains some citric acid as an added preservative. *Lerak* is known for its antifungal, antibacterial and insecticidal properties, therefore it is also used as a stain remover, and for insect mitigation. So, Java has a traditional plant-based textile cleaner that is not only still being used, with the knowledge passed down to the next generations, but has become popular and available to a much broader audience. This is the success story of a traditional method for preserving textiles!

Other traditional materials for cleaning textiles mentioned by the interviewees include *air merang* (liquid obtained from the ash of burnt dry rice stalks soaked in water), *turi* leaves (hummingbird tree / *Sesbania grandiflora*, Table 1), *waru* leaves (sea hibiscus / *Hibiscus tiliaceus*, Table 1) and *belimbing* leaves (bilimbi / *Averrhoa bilimbi*, Table 1). All these plant materials contain saponin, a natural surfactant. Recipes made with these plants mostly apply to cotton and do not appear to be used very often, due to lack of time and plant availability. Similarly, some stain removal materials cited, but not often used today, include lime juice (*Citrus x aurantifolia*, Table 3), lemon juice (*Citrus medica*, Table 3), bilimbi juice, *mengkudu* juice (noni / *Morinda citrifolia*, Table 3) and rinsed rice water (*air cucian beras* / *Oryza sativa*, Table 3). The acid contained in the fruits helps to remove stains.

The Javanese and Madurese also have a custom of adding natural fragrances to batik cloth after washing, by soaking them in a mixture of water with crushed patchouli leaves (*Pogostemon* species, Table 2). The fragrant aroma of patchouli leaves will last a long time. There is a similar recipe, specifically for Javanese traditional brown-dyed *soga* batiks, using a bath of tea leaves (*Camellia sinensis*, Table 5), which deepens the faded-out brown dye, thus preserving the colour. Tea has tannic acid and dyeing properties, therefore using it as a cleaner is not advised, as it may discolour the fabric.

Other Textiles

Without exception, all interviewees stated that while cotton batik are washed, hand-woven silk brocades, *songket*, metallic textiles and some ikat cloths are not washed, especially the very precious ones. They are usually hung in a shady area after being used to remove perspiration and to fully dry, and then stored in a special place that is dry and protected from insects. This is probably because the colour is not fast and the metallic threads and embellishments will be torn away by washing.

Insect Mitigation, Storage and Preventative Practices

Prepared sachets of *ratus* used for the meratus smoking process. (Source: Supriyadi)

Meratus, meaning "to smoke using the *ratus* blend of herbs", is a special Javanese technique that has been practised since long ago and is still used today to preserve batik cloth. Elderly women in particular who have passed down the secrets of the *ratus* blend of herbs practise this technique. The principle of the *meratus* method involves smoking using a special blend of herbs that include sandalwood, vetiver, rhubarb, fenugreek, clove, among others, mixed into a sort of incense, becoming *ratus* altogether, that can subsequently be burned. This is usually done after the batik has been washed with *lerak*, while the cloth is still damp. It is effective as a traditional form of medicine and has proven insecticidal and antibacterial properties. The strong smell produced by these herbs, which permeates the cloth as smoke or vapour, is an effective insect repellent. In addition, the process of smoking dries out the batik cloth and prevents mould and mildew. The *ratus* recipes are family secrets, with the knowledge of ingredients passed down from mother to daughter, and master to student. It is possible today to purchase ready-made herbal packets in traditional markets, but the ladies will not reveal their ingredients.

Other materials used in insect mitigation, both in the past and some today, include pepper (*Piper nigrum*, Table 4), vetiver (*Vetiveria zizanioides*, Table 4), clove (*Syzygium aromaticum*, Table 4), pandan flower (*Pandanus amaryllifolius*, Table 4), soursop leaves (*Annona muricata*, Table 4) and betel leaves (*Piper betle*, Table 3). These materials are usually put near the textiles in a cupboard as a barrier. Another method practised by one of the late famous batik artisans involved putting a (male) peacock feather inside the cupboard to protect batik cloth from insects. The peacock feather's bright colours are produced by microscopic crystal-like structures. Slight alterations in the spacing of these structure cause different wavelengths of light to be filtered and reflected, creating many different iridescent hues, a visual effect that might frighten insects and keep them away.

In other regions, sometimes the process of preserving textiles takes place before the dyeing process, in particular before dyeing with the root of *mengkudu* (*Morinda citrifolia*, Table 3). In Ende, Flores, East Nusa Tenggara, the yarn is pre-treated with special herbs before dyeing with *mengkudu*. The herbs are first boiled with *abu dapu* (liquid obtained from coconut palm frond ash, soaked in water), and then the mixture is applied to the ikatted-yarn before it is dyed. The process is called *pusimina* and is believed to be a sacred process only to be performed by the master dyer. No one is allowed to witness the procedure, and pregnant or menstruating women cannot pass through the area, so the *pusimina* takes place in a hidden location. The odour of the herbs will last for years and serves as an insect mitigation method. Similar processes are also practised in Maumere, Flores.

Demonstration of the *meratus* smoking process using a brown-dyed soga batik by the late Ms Nora Gunawan. (Source: Supriyadi)

Conclusion

Some traditional methods for cleaning, removing stains and preserving textiles are still practised by Indonesians. The use of *lerak* and *ratus* in Java is extraordinary, with the knowledge and practice being transmitted to the younger generations and certainly amongst collectors. Local beliefs also play an important role in preserving traditional textiles as a more holistic approach; the making of a batik or weaving, the value of it, its spiritual power, are all aspects that influence the ongoing life of the textile, including thoughtful storage and preservation.

But there are many remedies and practices that are now forgotten and not written anywhere, as most of this wisdom and practical recipes are traditionally passed down orally within communities.
The study of traditional methods for preserving textiles is very important, because these techniques are safe for textiles themselves and for the environment. Education about traditional textiles and textile care for future generations is very important in order to preserve “local genius” and to keep these valuable traditions alive.

INTERVIEW HIGHLIGHTS

Ali Abubekar Pae

48 years old, Dyer / Ikat Designer
Ende, Flores, Indonesia

Ali grew up amid weavers and traditional weaving practices and feels part of it. He designs ikat patterns and dyes using chemical dye. He is very aware of his culture and generously shared his knowledge about techniques, traditions, taboos, special motifs and the stories and supernatural powers behind them. As a practitioner, he is concerned about the preservation of traditional textiles, excessive mass production and the transmission of traditional customs.

Sri Sintasari Iskandar

70 years old, Collector / Connoisseur
Jakarta, Indonesia

Sri Sintasari Iskandar, called Neneng, is very knowledgeable about traditional methods in caring for fine textiles, especially batik. She inherited a batik collection from her mother, who also taught her how to take care of these precious textiles. She is also very learned about batik, its philosophy, meanings, power and other spiritual aspects, passed on from her guru, the late batik maestro Go Tik Swan Panembahan Hardjonagoro. She combines knowledge from the old days and her personal experience, and has rich information about how to take care of batik cloth. Her love of and devotion to batik is reflected in the way she treats her collection, all by herself using traditional methods: washing batik with *lerak* regularly, washing silk with tea, using pepper as an insect repellent, airing her pieces in a breezy location, etc. “People often call me an old-fashioned lady, but the old-fashioned way is always eternal.”

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ANNISSA MAULINA GULTOM

Museologist, Curator, Researcher
Museum Kain (2012-2016), Jakarta History Museum (2016-2017)

Annissa M. Gultom is a researcher, curator and museologist with an academic background in Archaeology (Universitas Indonesia) and Museum Communication (University of the Arts, Philadelphia, USA). The scope of her work in museum curatorial development includes Indonesia's regional anthropology, modern history, prehistory of the region, colonial history and specifically, Indonesian traditional cloths. Her knowledge on batik traditions and Balinese traditional cloths was established further during her involvement in the planning, development and operations of Museum Kain that was located in Bali, Indonesia.

After a short involvement in Balinese museum initiatives (Indigo Museum and Buleleng Museum), she was acting curator for the Jakarta History Museum, Museum Bank Indonesia and Jakarta Biennale 2017: JIWA. She is currently Director of Museums at the Department of Antiquities and Museums of Ras Al Khaimah, United Arab Emirates.

INDONESIA(BALI)

Annissa Maulina Gultom

Introduction

Does textile preservation always involve the act of cleaning? Apparently, not always.
This research, focusing on the heritage of Balinese cloth, aims to gain an understanding of the customs and practices, and how the prevailing traditions do not always have to involve "cleaning".

Figure 1: Tying the threads with plastic rope to create intricate ikat patterns that are left uncoloured as the plastic rope used to tie and create the patterns will resist the colour.
(Source: Annissa Gultom)

Bali's wealth of ikat and brocade cloth traditions has survived along with their Hindu Balinese lifestyle, and illustrates a long tradition of careful preservation of textile traditions. Nestled off the coast of Java, and part of the greater archipelago, it is the only Hindu Buddhist enclavement in Indonesia. The ikat tradition still survives, although now it uses "modern" means to create the pattern (such as plastic rope as seen in Figure 1) and even developed into different forms of ikat, such as the *songket* tradition practised in other areas which features metallic material (Figure 2).

Cloth is integral to the rigours of all religious ceremonies, which occur regularly (Figure 3 and 4). Most of the rituals related to Balinese ikat and brocade are preserved and inherited, and continue to be made today with the same methods and motifs. Balinese culture shows a more cohesive integration of cloth tradition into their daily life, in comparison with other areas in Indonesia. Balinese rituals are numerous and all involve the use of cloths, either to be worn, as part of the sacred architecture, or in other aspects of the cultural landscape. Although modern variations, style and manufacture methods have developed over time, the Balinese have preserved their original knowledge and understanding of Balinese ikat and brocade (Figure 5). Of course not all of the young generation can explain why certain kinds of cloth are worn for certain rituals, yet they can still differentiate which one to wear to which ritual. Batik made from cotton, a softer material, is worn in Bali for daily use, and according to an interviewee, it is common to wear batik *kain panjang* as skirts for funerals, while the rest of the Hindu rituals require the Balinese to wear Balinese ikat.

Bali has even developed a "modern uniform" based on the ikat cloth, to show the roots of their cultural identity, taking the traditional cloth and patterns and adapting them to daily wear for both sarong and tops. This is similar to the developments associated with batik since the 1970s, whereby the traditional long cloth or *kain panjang* was transformed into skirts, shirts and jackets as uniform pieces for schools and public offices. Bali has a rich tapestry of textile traditions, which have been evolving over centuries, along with attitudes and methods to preserve them.

Figure 2: Complex combination of silk and metallic brocade weaving used for ceremonial events.
(Source: Annissa Gultom)

Figure 3: Balinese women dressed in traditional ikat sarong for a religious ceremony.
(Source: Annissa Gultom)

Figure 4: Balinese men dressed in traditional clothing for a religious ceremony.
(Source: Annissa Gultom)

Figure 5: Balinese dressed in traditional clothing for a social event.
(Source: Annissa Gultom)

Methodology

The research presented herein was done exclusively in Bali, in the surviving traditional cloth making regions in eastern Bali (Sidemen, Tenganan, Klungkung, Seraya), with some resources in central Bali (Ubud, Pejeng) and one in northern Bali (Banyuatis). These are the main areas of cloth production. The oldest traditional cloth making location known in Bali is in Tenganan Village, Karangasem, East Bali, but fieldwork in this village was not included in this survey project, as a 2015 survey done with the Museum Kain determined that the cloth making narrative in this village was solely tourism-oriented, with mass production pieces mixed with some original cloths. The confusion of what was original, authentic or outsourced, and the community's incapacity to articulate the complex traditions of these famed cloths made this site problematic. In addition, local experts consulted as part of this project confirmed that the only method used to clean the textiles is water; only water, no detergents, or other additives. Both experts, Tjokorda Gede Yudha Pemayun (from Pejeng) and Ida Ayu Ngurah Puniari (from Batuan) are co-founders of Yayasan Kain Pebali (Foundation of Balinese Cloth) and have studied the cloths and traditions of Tenganan.

The interviews were done in informal settings and conducted in conversation, without giving the written questionnaire to the interviewees. The formality of paperwork could potentially distance the interviewees, and knowing the nature of Balinese people, it was best to have them share their knowledge in their own comfortable setting. Some were interviewed in their place of work, or at a cultural exhibit. Most of them have a relationship with cloth making, as makers, sellers, collectors or researchers. Everyone was very willing and interested to talk and participate in this research. Overall, 12 people participated in the survey; eight women and four men. The mean age was about 50 years old. There were two young girls in their twenties and an older 76-year-old weaver. Some of the interviews were videotaped, and all interviews were conducted in conjunction with Noviani Christin Ngantung, a research assistant from the Museum Kain staff. Christin is a local resident of Bali who is knowledgeable in traditional cloth as she has worked for BINhouse Indonesian Creation for five years, and Museum Kain for more than two years, and her command of the Balinese language is good.

The only systematic publication on the subject was produced by Ida Ayu Ngurah Puniari, a Balinese cloth researcher: *Kain Bebali: Sacred Cloth, Meaning and Usage in Balinese Hindu Rituals* (2011, in English, illustrated edition, Indonesia Heritage Society, Jakarta). The book is based on Ida Ayu's academic script titled the same in Indonesian: *Makna dan Pemakaian Kain Bebali dalam Upacara Agama Hindu di Bali.* Other publications used to support the preliminary knowledge in this research were on the general scope of Indonesian traditional cloths and scientific research on the use of *lerak*.

Conclusion

The research shows that there are not many traditional methods used in preserving or maintaining cloths in Bali. They rarely clean ceremonial cloths, as each kind is quite rare, and is used and worn for a specific ceremony. A few points in their ways of preserving their textiles are:

1. The less you wash, the better.
2. Blue indigo-dyed cloths needs regular airing; while red-coloured cloth is enhanced over time through multiple wearing and with the oil originating from the wearer's sweat.
3. Storage must have regular schedule of drying out the cloths outside (*diangin-angin*) and not under direct sunlight.

A limited response regarding natural cleaning agents for batik cloths included:

1. *Lerak* (soapnut/*Sapindus rarak*, Table 1) is made into a foamy solution and then used to wash cloth with the natural saponin.
2. *Merang*, or a lye solution made from the ash of burnt dry rice stalks, is also used to wash cloth by soaking it in the *merang*.
3. Lime juice is sometimes applied to the cloth to treat strong stains.

This knowledge of "not always washing" to maintain the health of the textile is important information to enlighten the general view of obsessive cleaning. People in general tend to clean, clean and over-clean, wearing the textile out and then discarding it. This is how contemporary mass-produced clothes are treated. Most people do not realize the risk of losing the textile, along with the stain that we want to get rid of. This knowledge can also be a great insight for textile conservators in Indonesia or even beyond on how to treat Balinese textile collections. As longevity of the collection is one of the main purposes of heritage preservation, the Balinese way of maintaining their textiles is a great example. One piece of Tenganan cloth collected by Arma Museum in Peliatan, Ubud, has survived for over 100 years, and it still looks strong enough considering it is a century-old textile. Since it is kept carefully, and not cleaned, it is stable. The adage "less is more" is an important guideline in conservation.

INTERVIEW HIGHLIGHTS

Tjokorda Gede Yudha Pemayun

55 years old
Village Chief / Indigo Dyed Cloth Maker
Pejeng, Gianyar, Bali, Indonesia

Pak Tjok was one of the most resourceful resource persons in this research due to his position as the village chief, the head of Pejeng Palace, a clothmaker and also the co-founder of Yayasan Pebali (Balinese Cloths Foundation) that started the movement of Balinese cloth heritage preservation and development. His conclusion of how Balinese cloths are not interesting (enough) and in need of new innovations (through his indigo pieces) is an interesting take. His deep understanding of heritage also helped to confirm similar information given by other interviewees, which is that they don't really wash their cloth. Especially for the ikat pieces, the more it is worn (some only worn once or twice a year), the more the oil traces from the wearer's sweat is believed to make the ikat even shinier and better looking through time.

Ni Wayan Kembar (Ibu Sandi)

50 years old
Office Assistant
Ubud, Gianyar, Bali, Indonesia

Ibu Sandi is an office assistant who works for a cloth maker, yet her work has no relation to the cloth making activities. As a Hindu Balinese, her life is surrounded by numerous different kinds of cloths used for various rituals and social events. I was assuming that she might have some kind of cloth heritage knowledge from her employer, yet she knew about the use of lerak to wash cloth from her grandmother. She recalls how her grandmother used lerak as a soap and to wash cloths. This habit was neither carried on by her mother nor by her. Information from Ibu Sandi is important as she represents a small percentage of the general Balinese population who witnessed the use of lerak among those two generations before them.

On the other hand, knowledge is more limited in relation to the natural cleaning agents *lerak*, *merang* and lime juice, which came to the island with Javanese batik use and sales. There is a growing adaptation of using *lerak* in contemporary batik cloth maintenance. Batik stores in big cities provide powder and liquid *lerak*, and it is even available online. Yet this modern use of *lerak* is still only attached to the use of batik cleaning, and not widely adapted in Bali. Most interviewees even suggested soft shampoo or dishwashing soap instead of *lerak*. *Lerak* is also not as easily found and only available in the largest traditional market, *Pasar Badung*, in Denpasar, at one herbs seller. Supply and demand may change this. The knowledge and use of *lerak* seems to have been and continues to be used more on Java, and other batik producing areas outside the island.

In conclusion, not washing can be a good, and proficient, way of preserving.

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VIENGKHAM NANTHAVONGDOUANGSY

Weaver and Fashion Designer
Vientiane

Viengkham is a weaving artist and fashion designer, co-founder and head of the Phaeng Mai Gallery since 1993 and the KHANG fine silk clothing line since 2008. She shows her collections in major fashion events in Laos and internationally. Her woven designs have won numerous international awards: 2004 and 2006 Seal of Excellence Asian Pacific Handicraft Development Association, and 2005 Good Design Award Japan. In 1998 she worked for UNESCO as a Lao weaving expert, and taught Mozambique textile artisans. Viengkham learned weaving from her mother and grandmother when she was 6 years old, selling her pieces at the Vientiane market. Now, a few decades later, people recognize her as a master weaver of the Lao floor loom.

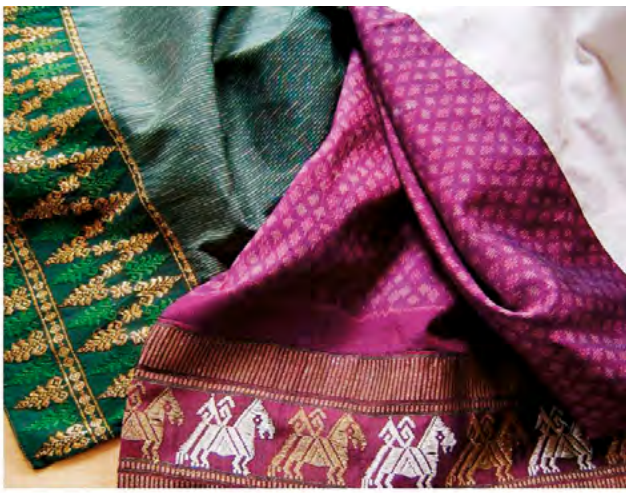
Some of Viengkham's publications include: "Weave on our Great Grandmother's Loom", "Legends in the Weaving", "Weaving Cloths Weaving Naga", and the latest edition of "*Sinh* and Lao Women", now translated and published in Japan in 2008.

LAOS

Viengkham Nanthavongdouangsy

Introduction

Since ancient times, almost every woman in Laos has been engaged in producing textiles for household use and trade, contributing to the richness of Lao textiles. Lao cloth-making techniques are very diverse, ranging from very simple to highly skilled methods, and they vary from region to region, both by the techniques and materials employed. It was quite a big surprise when the topic of how to clean and how to remove stains from textiles was raised; in fact, we have found that in Laos, cleaning and the application of cleaning substances are quite restrained and simple. Moreover, many people say that they try to completely avoid any washing of their cloths. Based on this idea of non-cleaning, research was launched to learn more about traditional methods of textile preservation in Laos.

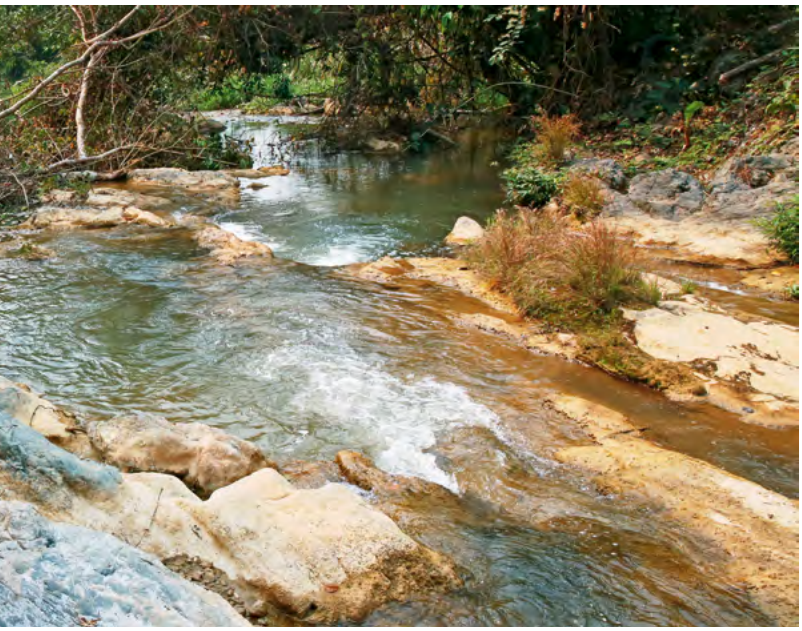


Antique traditional silk ikat and supplementary weft women's wrap skirts, or "sinh".
(Source: Viengkham Nanthavongdouangsy)

Methodology

Traditional spinning of cotton and silk for weaving.
(Source: Viengkham Nanthavongdouangsy)

The research was conducted in Vientiane and Luang Prabang by individually interviewing ten women aged in their fifties and sixties. During these interesting conversations, the interviewees recollected the traditional methods their families had used to preserve textiles. Most of the interviewees mentioned that they group their cloths into two categories of usage – for daily use and for special occasions – and handle each category differently. It took a lot of questioning, but the women interviewed do recall their traditional practices, and some still apply some of the methods. Like in many other Asian countries, the use of traditional materials and methods depends on the person's location – urban or rural – and economic situation. It is a matter of convenience and accessibility.



Cloths can be washed in the river or using water from a well.
Top: A stream in Luang Prabang.
Bottom: Drawing water from a well, Nongkiew Village, Savannakhet Province.
(Source: Viengkham Nanthavongdouangsy)

Cleaning Methods

Mild Cleaning

For cloth that is not heavily stained, or soiled only with perspiration, 100% of the interviewees confirm that the best method is washing with plain cool water, preferably in a river, and drying the cloth in the morning sun. When ironing is necessary, the surface of the heated charcoal iron (note that the type of iron mentioned herein is heated with hot coal not electricity) should be smoothed first by a banana leaf or soft thin cloth, and used as a barrier, to make sure the iron will not crease or damage the valuable piece of cloth. Every garment should be spread out and dried in the wind or under gentle sunlight before storage.

Semi-dirty cloths are washed in a solution of soapnut, a natural saponin, which is native to and well known throughout Laos. In the north of the country, people mentioned wet-cleaning with a solution made from winter melon (*Benincasa hispida*, Table 1) and also from angled luffa (also known as Chinese okra or *Luffa acutangula*, Table 1). Ethnic groups from the south cited the use of another cleaner, which is a little more caustic. They boil sections of a banana trunk in water to produce a slightly alkali solution of sodium hydroxide, and use the solution to wash their cloths.

Some people mentioned the use of coconut water and rice water in cleaning textiles, but a number of disagreements were raised concerning the risk of attracting insects and damaging the fabric. So these materials are not included as part of the collected data. One interviewee said she would never apply coconut water on her *sinh* or skirt because of spiritual beliefs; she respects the coconut as a holy fruit used in food and religious ceremonial rituals.

The Most Extreme and Invasive Cleaning Method

For cloth that has been used for work, soaked with perspiration and soiled, they are washed as soon as they are taken off the wearer. Naturally, this is to prevent bad smells and to reduce the staining and moisture from deeply permeating and damaging the cloth. This kind of soiled garment is sometimes washed in a light lye solution, made from filtering water through the ash from burnt wood, rice straw (*Oryza sativa*, Table 1) or banana stalk. The above-mentioned light lye solution is also used for removing stains from cloth; it is a strong and caustic stain removal. Interviewees cautioned that it is important to make sure that the cloths are properly rinsed to remove any ash residue as it could rot the textile.

Storage

Most people keep their precious pieces in a wooden box, or a woven basket that has been cured with smoke. The woven basket allows for air circulation, and the smoking is an anti-insecticide and anti-fungal treatment. This method makes a lot of sense in a humid tropical climate where air circulation can prevent mould and fungi. Another storage method cited in additional research is the use of clay pots. These were used during the period of the Secret War (an intensive bombing campaign over Laos led by the US between 1962 and 1973), when women were trying to safeguard their special and inherited *sinh* and other textiles from bombs, looting and rodents. There is strong evidence that many heirloom Lao textiles sold to dealers in Thailand in the 1980s had been stored in clay pots (Julia Brennan, field interviews 2000-2009). For insect mitigation and as a moisture absorbent, people cited the use of tobacco leaves in the container. Others use charcoal wood for preventing moisture and reducing unpleasant smells. Camphor wood is also used to discourage insects.

Conclusion

Every traditional cloth is worthy of being preserved within the family, as each one has been carefully thought out and designed to fulfil its purpose. For example, the simple man's shoulder cloth (*pha bieng*), often plaid cotton, is generally handwoven by a woman in the family or village. The donning of a sash has been practised since ancient times and is still carried out in the countryside today to show respect and honour a visitor, whether for a planned or unexpected visit. Before a man proceeds to meet the guest, he will automatically put on his *pha bieng* shoulder cloth, even if his torso is naked.

Ms Vandara Amphayphone and author/researcher Viengkham in Luang Prabang. (Source: Viengkham Nanthavongdouangsy)

Worry was voiced among the interviewees concerning the new generations, who may adore textiles for their looks and glamour, but who do not appreciate the cultural meaning and beauty behind them. A new generation of young Lao people do not know how much time is involved in the dyeing and handweaving of traditional cloths; they wear them as if they are ready-made. And in fact, they are being influenced by foreign styles and massive commercial imports of non-traditional and non-Lao clothing. The elders, the women interviewed, would like to encourage every individual, family unit, school and organization to contribute to maintaining the traditions. This effort must start with each family educating their children to use textiles in a proper way, and choose the appropriate type for each function and occasion. Then, education must go deeper so that the young generation will understand the intangible significance and fundamental uses of textiles, as well as their aesthetic and spiritual value. This approach will lead the successive generations to better preserve and care for the textiles. This is an urgent need today.

MOHD SYAHRUL BIN AB. GHANI

Senior Curator
National Textile Museum Malaysia

Mohd Syahrul bin Ab Ghani is a Senior Curator at the National Textile Museum of Kuala Lumpur, an entity under the Department of Museums Malaysia, Ministry of Tourism and Culture Malaysia. He specializes in Collection Management and Collection Care. He is also responsible for the administration of the museum, which includes personnel management, public relations, building management, including issues related to building safety and pest management control. He curated several exhibitions such as “Batik by the Yard: Design and Innovation 1960s – 1990s”, “Batik Sarong: A Legacy for Today and Tomorrow”, and “World Costume Dolls Exhibition” in National Textile Museum.

Syahrul is also a professional dancer. His experience through years of performing has given him an eye for the beauty of textiles.

MALAYSIA

Mohd Syahrul bin Ab. Ghani

Introduction

Traditional clothing is always changing, and so is fashion, as communities experience changes particularly from technological advancements due to increasing globalization. The “authenticity” of a traditional dress may change and take a new form through a process of cultural transformation. As textiles and costume evolve, the traditions of fabrication, care and preservation as well as the value of textiles also change. Information on the transformations of Malaysia’s textiles and costumes largely focused on fabrics from palaces, and people of high status, about which some written documentation can be found, including methods for washing and storing textiles. Sadly, the same cannot be said for ordinary everyday textiles or those from the broad and diverse population. The wisdom of caring for textiles was passed down orally, from one generation to another, and was rarely recorded in writing. Post-colonialism saw an increase in documentation by scholars and researchers about traditional Malay life and history, including drawings and writings. An interest in cultural expressions and customs has afforded more information for a museum and a valuable archive of traditional knowledge.

Methodology

This research looks into the traditional methods of textile preservation existing in several parts of Peninsular Malaysia, namely Kelantan, Terengganu and Pahang, all of which are famous for woven textiles and batik resist. Information was gathered through interviews and consultations with individuals living in Kuala Lumpur and Selangor to unearth the recipes used for the traditional care of textiles, including the formulation of a cleaning detergent. These individuals were weavers, textile sellers, village people, museum professionals and elderly people. Other discussions were conducted with textile professionals and collectors involved in the preservation of historic textiles and clothing. This diversity aided in evaluating the similarities and differences between cultural groups and various types of textiles artefacts and their care. Unfortunately, there was no observation of rituals such as weddings, rites of passage, and other ceremonies where special textiles are used.

Methods of Textile Cleaning and Care

Through this research, one common thread emerged: the importance of preserving historic and traditional textiles for future generations. Valuable textiles are scarce and require intensive care. This was true for rural and urban interviewees, yet their methods of care differed according to economics and location. But some of the plant methods cited are in fact **still in use** by the older generation.

Preservation techniques for precious textiles, used occasionally for weddings, religious ceremonies and performances, differ from those for everyday clothes. Due to high humidity levels in Malaysia, there is more chance to perspire or sweat when wearing heavy brocaded cloths, such as the silk and metallic threaded *songket*. Sweat, which is water and sodium chloride, causes damage to the textile's texture and strength, accelerating the rotting stains and leaving an unpleasant odour. Various methods have been used to remove perspiration odour from clothes. Woven fabrics such as brocades and *songket* (an important silk and metallic threaded textile) were smoked or vapourized with crushed *serai wangi* (citronella, a type of lemongrass, *Cymbopogon nardus*, Table 2). For strong cotton cloths, such as batik, the same plant was used, crushed and mixed with warm water. Then the cloth is hung to dry, usually in the morning before the hot sun, in a well ventilated area. For drying the sarong, two long poles are used in opposite directions to tension the sarong and prevent wrinkles. Another cited wet-cleaning method involves the use of *nilam* leaves (*Pogostemon cablin*/patchouli, Table 2), which were used for cotton batik to retain the colour/dyes.

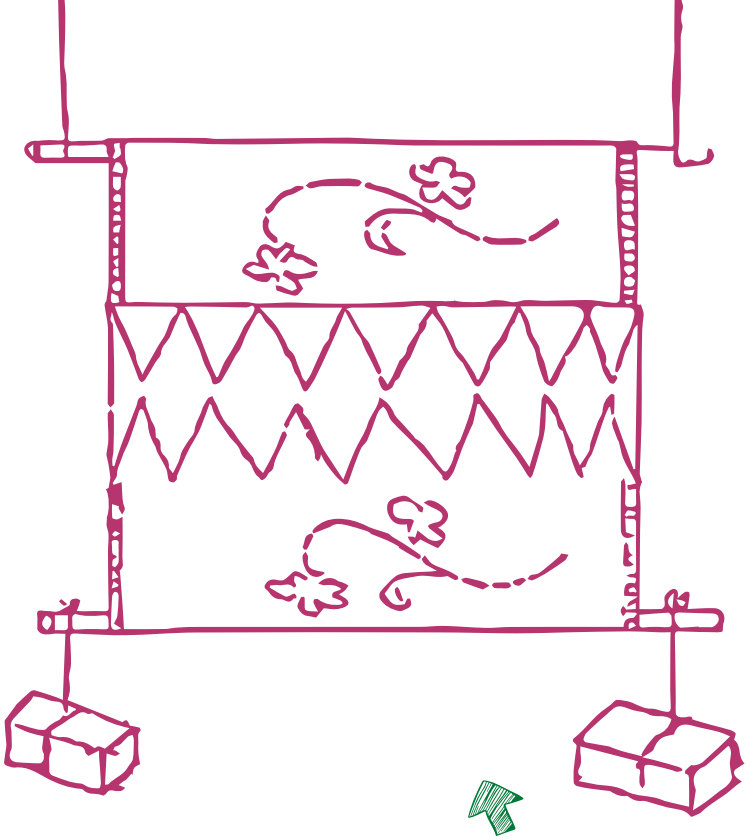
Malaysian traditional songket woven with metallic thread.
(Source: National Textile Museum, Department of Museums Malaysia)

White clothes that have been stored too long can become discoloured and lose radiance. Some people only use warm water to wash white clothes. Others cited using a slurry of ashes from desiccated coconut husk (*Cocos nucifera*, Table 1) in warm water to whiten the white clothes. Ashes were used as a detergent and bleaching agent to wash fabrics in England or France in the 16th Century (McKeon and d'Ouessant 2009). Another typical method is washing with grain husk, rinsing with *buah lerak* (*Sapindus rarak*, Table 1), and then starching prior to polishing (Wan Yahaya Abdullah 2004). Starched cloth is intended to smooth the fabric and make it easy to fold for storage. The art of calendering is a traditional technique of polishing and strengthening woven cloth to last longer (Muzium Tekstil Negara 2012).

Previously, and in rare cases today, fabrics and garments were stored with fragrant plants. Plants such as *pandan* leaves (*Pandanus amaryllifolius*, Table 4) are placed in the wardrobe as a deterrent to insects. Some of the elderly interviewees mentioned the use of cloves (*Syzygium aromaticum*, Table 4) as an insect deterrent. In order to prevent direct contact with the textile, clove studs are sewn into a cloth sac, and placed in wardrobes and storage boxes. Another common method used by the Malay community for perfuming their fabrics in storage is incense and smoking. This method is also referred to as a dry cleaning method. Clothes are laid over mesh structure, which is

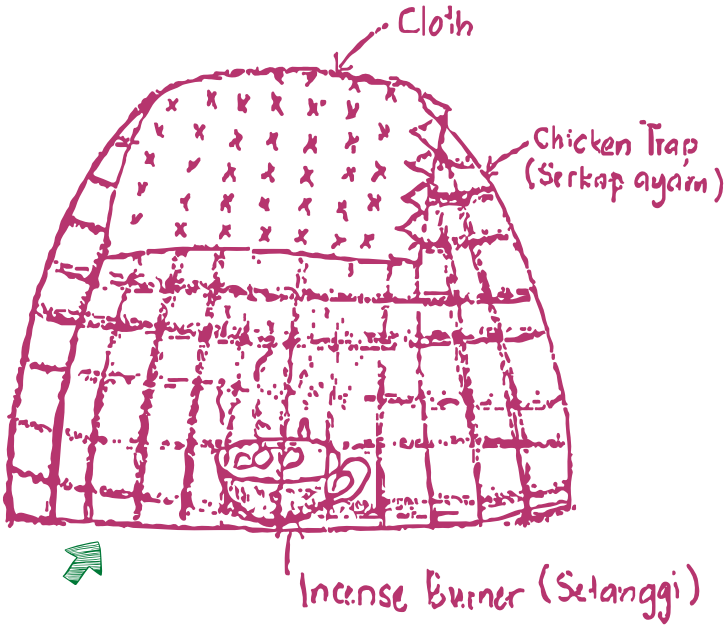
above an incense burner smoking with fragrant herbs ("*Meratus*", Table 5). Some people use a bamboo chicken cage as the mesh, and this is still practised today, especially for the *songket*! A living tradition.

Spiritual beliefs and superstitions are associated with many traditional textile care practices. For example, some people believe that hanging or drying clothes at night can invite bad spirits. The wisdom of the older generation is evident in methods of storage, washing and perfuming, and also in controlling pests and insects. *Pandan* leaves are used as a fragrance, and as a major repellent for cockroaches. Similarly, cloves and cinnamon (*Cinnamomum sp.*, Table 4) are said to protect fabric from attacks of silverfish and ants. Weavers, always wanting to preserve their labours, use kerosene for pest control. Kerosene is applied to smooth the threads and to protect the fibre from pest attacks. In addition, citronella not only gives a pleasant fragrance for clothing storage but is also a natural pesticide. Meanwhile, sandalwood (*Santalum album*, Table 4) is used to make cabinets and boxes for textile storage, as the wood is disagreeable to insects.



Author's sketch on the use of poles to create tension and prevent wrinkles whilst drying cloth.
(Source: National Textile Museum, Department of Museums Malaysia)

Cabinet made from sandalwood to deter insects
(Source: National Textile Museum, Department of Museums Malaysia)



(Source: National Textile Museum, Department of Museums Malaysia)

Conclusion

Modernization has stimulated mass consumerism, and the advertising industry has taken a lead role in promoting ready-made "western" fashion. Today's younger generations are not encouraged by mass media or society to use traditional clothing or learn how to take care of their clothes and textiles. Traditional methods are considered to be primitive and outdated and certainly entail more work. Therefore, today it is only the elderly who continue to use traditional methods and plant materials to care for their precious textiles. When this older generation passes away, the traditional knowledge and skills will die with them. Government and non-governmental organizations such as museums, craft centres and art galleries, witnessing the loss of handmade and traditional textiles, are starting to recognize the importance of this intangible heritage – and the age-old wisdom of caring for material culture. While experts and museum staff from the field of textile conservation are being sent overseas to share their expertise in Malaysian arts and learn better preservation methods, there is not enough being done to re-examine local practices and to chronicle the preservation traditions of Malaysia. This study is a first step and will hopefully promote further research.

INTERVIEW HIGHLIGHTS

Puan Hajah Nortipah bt. Abd Kadir

70 years old, Weaver
With her daughter **Norhidayah Kampung Pulau Keladi**, Pekan, Pahang

Ms Sultan, the eldest of the 10 respondents, grew up in an age where she practised the traditional washing and smoking rituals of textiles. None of the other respondents had first-hand experience. She had a very sharp memory and provided details about the type of plants and herbs used for the smoking and how the fragile special *songket* were always smoked, because they could not be washed ever.

Raja Fuziah binti Raja Tun Uda

78 years old, Collector, Ampang, Selangor

Raja Fuziah binti Raja Tun Uda is a relative of the Selangor Sultanate. She has a long and distinguished career in the development and promotion of the arts and crafts of Malaysia. Following her ten years of service with the training division of Majlis Amanah Rakyat (a government agency working in business and industry), she was appointed the first Director-General of the Malaysian Handicraft Development Corporation. From 1986 to 1989, she was the Officer-in-Charge at the Istanbul-based Research Centre for Islamic History, Art and Culture. A former Regional President of the World Crafts Council Asia-Pacific and President of the Crafts Council of Malaysia, she continues to sit on the Board of Trustees of the National Library. Raja Fuziah, who has curated several craft exhibitions and contributed numerous papers at international conferences, has received many awards for her work, including Malaysia's National Arts Award in 2009 for her individual efforts in promoting the arts. On the care of cloth, she learned from her mother. During her childhood she often watched her mother perfume silk batik cloth using a vapourizing technique with citronella soaked in hot water.

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AYE MI SEIN

Deputy Director, National Museum (Nay Pyi Taw)
Department of Archaeology and National Museum
Ministry of Religious Affairs and Culture
Republic of the Union of Myanmar

Before becoming Deputy Director of the National Museum in Naypyitaw, Ms Aye Mi Sein had worked at the Department of Archaeology and National Museum for 19 years. She has more than 10 years of experience in the excavation of historic and proto-historic sites in Myanmar and also participated in the Ausuka Palace excavation in Japan. She was a lecturer in Anthropology and Human Osteology at the Field School of Archaeology for two years, and was the curator for the Beikthano Archaeological Museum exhibition. She has been working in cultural heritage management for over three years and has been organizing the nomination of documentary heritage for the UNESCO Memory of the World Register.

She obtained her BA (Hon.) in Anthropology in 1993, Diploma in Archaeology in 1995, and MA in Archaeology in 2001 from Yangon University. She also received the International Certificate of Applied Anthropology and Development Process from La Sapienza University, Rome, Italy.

REPUBLIC OF THE UNION OF MYANMAR

Textile Treatments in Myanmar: Enduring Traditions and Modern Practices

Aye Mi Sein

Introduction

This project comes at an important time in Myanmar's historic development. Since 2010, with the opening of Myanmar's doors to globalization, much has been changing regarding the use and production of traditional textiles. Therefore, it is important to find out about Myanmar's old textile styles, textile-related indigenous and local stories, and methods and materials used to preserve and take care of traditional textiles in this rapidly evolving environment. Myanmar has a rich history of traditional textiles, silk and cotton, from the lowlands, such as *luntaya* (one hundred spool design), and many styles of textile from tribal groups. The country is characterized by immense diversity; there is a huge variety of textiles, each with its own unique process, pattern, design and associated traditional preservation method. Many communities practise weaving and stitching to produce cloth, an activity which usually falls under home production or small-to-medium enterprise. There are also a few larger scale historic textile producers, such as the Saunders' Weaving and Vocational Institute, which still use shuttle looms and synthetic dyeing to produce cloth that is part of daily life. This includes the man's *longyi* (လုံခြည်) or skirt, bed cloths, household fabrics, and fabrics for different ethnic groups.

Weaving *luntaya*, a complex tapestry weave, at the Aung Myanmar Silk Workshop, Mandalay Region. (Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar)

Methodology

Ten subjects consisting of five men and five women from different parts of the country were interviewed with a questionnaire template. They included three fabric and silk shop owners; three government officials from the National Museum, Ministry of Religious Affairs and Culture; two professional weavers; and the principal and one teacher from the Saunders' Vocational Weaving Institute. Among the interviewees, two were younger practitioners in their thirties, several were in or nearing their fifties, and one was an elderly in his seventies.

The group of interviewees from the professional weaving institute provided data on textile production, while the group of fabric and silk shop owners shared information on the historic value and details of textiles. One group of interviewees, being employed at the Ministry of Religious Affairs and Culture, have been exposed to international heritage practices and conservation standards. These varying subsets of data represent altogether a more comprehensive resource on how to clean textiles, remove stains or deter insects.

Myanmar textiles hanging in a silk shop (Shwe Sin Tai) owned by Daw Ohmar in Amarapura Township, Mandalay Region. (Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar

Textile Preservation

There is a distinction made between the preservation of valuable textiles and those less valuable used as everyday clothes. People want to preserve the valuable textiles for a long time and discard those deemed insignificant when they become damaged. In Myanmar, both traditional and modern techniques are used for textile preservation, cleaning, stain removal and storage. However, as chemicals are readily available nowadays, people opt for chemical cleaners for convenience, resulting in the fast disappearance of traditional methods in textile preservation. So, it is very important to record and pass down the traditional knowledge and skills of textile preservation to the next generation.

Case Studies

The Saunders' Weaving and Vocational Institute was an important source of data for this study. Saunders was founded in 1914 to ensure that old weaving traditions, including weaving methods, fibre use and dye processes, remain a living profession. Over the years, Saunders has become a successful institute for the study, archiving, research and development of weaving technology, and the training of skilled weavers and technicians. There are now 14 branches of Saunders textile training schools in Myanmar, in order to maintain and expand traditional textile related knowledge. Currently, the school is undertaking research on organic dyeing practices to keep this traditional knowledge alive. Since the arrival of chemical dyes around 1900, people have embraced bright colours and easy processing; many traditional organic dyeing practices were therefore abandoned long ago. With the Myanmar government's cooperation, the Japan Trade Organization (JETRO) supported Japanese organic dye specialists to hold workshops and training for Saunders. The Japanese experts and local participants studied the use of indigo and forty-four other organic dyestuffs. The result of this exchange was an exhibition of Saunders' new organic dyed fabric samples in Japan, which brought rapid orders and subsequent exports of many organic dyed textiles. The popularity of organic dyes has soared in the last decade, and Saunders has established itself as a leader in this industry in Myanmar.

Organically dyed textiles from the Saunders' Weaving and Vocational Institute. (Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar)

Saunders washes their silk with a commercially produced mild bar soap (Sunlight brand) or cream (not a detergent). They affirm that the washing makes the silk soft and beautiful, as the natural dyes become more enhanced and bright. For cotton, they wash with soap and water several times, followed by a softener and final wash. Ironing is done while damp, and the cotton becomes very soft. For the preservation of strong colour and dyes, salt, lime juice, vinegar, alum, ash water and copper sulphate crystals are used.

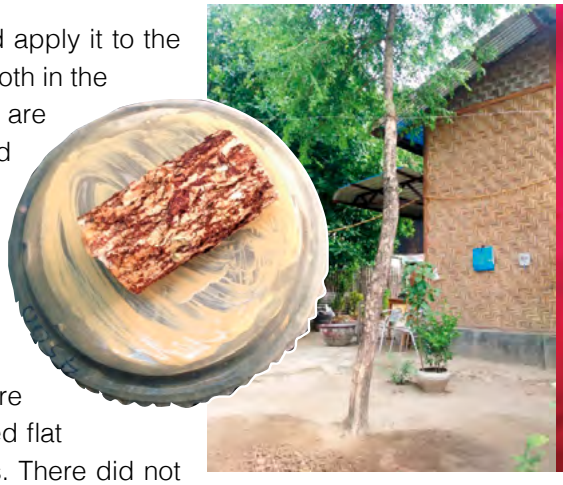
The individuals interviewed prefer not to wash silk because there is a general fear about fading or stressing the fibres. If necessary, silk can be washed with soap and water.

Drying clothes at the Department of Fine Arts, Ministry of Religious Affairs and Culture.
(Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar)

Stain Removal

In Myanmar, the traditional thanaka (သနပ္ပဒါး) bark is used for stain removal on textiles. In fact, thanaka is a sort of "miracle" plant used for nearly everything in Myanmar, from skin protection and abrasion prevention to household scrubbing and textile cleaning. It is formulated into powders, creams, salves, and is receiving international recognition. Its popular paste form is particularly effective in the removal of oily or "non-polar" stains on cotton and silk. The method is to grind the thanaka bark on a stone slab, dampen it with water to create a paste. The whitish paste is directly spread onto the oil stain, left to dry to act like a poultice, and then washed with water. Often, the stain completely disappears.

For rust stains, people use tomato (sliced) and apply it to the surface of the stain before drying the stained cloth in the sunshine and rinsing with water. Bloodstains are treated with cold salt water, and rinsed with cold water.



Left to right: thanaka paste preparation, thanaka tree and thanaka paste applied to an oil stain.
(Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar)

Storage

Based on the interviews, some people fold textiles inside out and store them in an iron box. This method of storage would be very secure from any rodent or theft. Some people indicated flat or hanging storage in cabinets and wardrobes. There did not seem to be any particular traditional method of storage.

The museum interviewees indicated that they use acid-free paper and roll flat textiles for long-term storage in drawers. Historic textiles are displayed at the museum, in an environment of low humidity, between 40% and 60% relative humidity. Light levels are kept low, the sunlight is blocked, and mothballs and naphthalene are used for insect and mould prevention. By and large, these methods follow international museum guidelines.

Textiles wrapped in acid-free Mulberry paper and stored in a cabinet at the Saunders' Weaving and Vocational Institute, Amarapura Township, Mandalay Region. (Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar)

Conclusion

Textiles and their production have always had an important social, cultural and economic role in Myanmar society. While the interviewed weavers and silk shop owners remain optimistic about the future of silk, recognizing that Myanmar people still wear silk clothing to a ceremony, most of the interviewees stressed the need for an organized effort to educate the next generation of Myanmar people to love their traditional textiles, wear them and learn how to preserve them. The interviewees noted that the use of the *longyi* and *htamain* (skirt, ထဘီ) is still common today. As the habit of wearing the *longyi* and *htamain* remains, there continues to be market demand for and the need to preserve these textiles. The same situation should be created for other traditional textiles as Myanmar is facing rapid urbanization and its people, like in all neighbouring countries, are fast adopting non-traditional clothing.

ALLAN S ALVAREZ

Museum Researcher II
National Museum of the Philippines

Allan S Alvarez is a graduate of the University of the Philippines – Diliman with a BA in Anthropology and has been a Museum Researcher in the Anthropology Division of the National Museum of the Philippines since 2002. Aside from conducting individual researches in the field of Anthropology, he is also involved in museum exhibitions, identification and classification of ethnographic materials, and preservation and documentation of collected specimens. He has done field researches in various parts of the Philippines, particularly in Pangasinan, Benguet, Ifugao, Mountain Province, Ilocos Norte, Cagayan and Batanes in Luzon; Romblon, Bohol and Eastern Samar in the Visayas; and Lanao del Sur, Sulu, Zamboanga City and South Cotabato in Mindanao.

In 2011, he was one of the participants in the ICCROM and SEAMEO SPAFA collaborative “CollAsia” programme on the Conservation of Collections and Intangible Heritage, held in Brunei Darussalam. Currently, he is working on a manuscript about indigenous designs and motifs and their meanings as reflected on the material cultures of different Philippine ethnolinguistic groups. Since April 2016, he has also been a team member of the multi-disciplinary cultural heritage preservation project for the restoration of La Inmaculada Concepcion Parish Church in Guiuan, Eastern Samar.

PHILIPPINES

Allan S. Alvarez

Introduction

The Philippines, an archipelago, has a vast diversity of ethnic peoples, cultural practices and textile production. In spite of increasing urban consumerism, and use of commercial or "easiest" detergents, it is truly remarkable that many traditional textile practices of creation and preservation are still vital and being passed onto the next generation. Therefore, this study is enriched by these living traditions and given more impetus to chronicle them, before more consumerism encroaches.

A 100-year-old blouse made from pure *piña* fibres with embroidery from the collection of Ms Anna India Dela Cruz-Legaspi. (Source: National Museum of the Philippines)

Many different types of fibres are used to produce ceremonial and highly desired textiles for a broad market. For example, the man's formal *piña* shirt, made of fine pineapple fibres and elegantly embroidered, is the standard dress for a huge range of Philippine men, both urban and rural, rich or poor. Throughout the islands, many different fibres are used, and local knowledge is rich in relation to specific fibres and weaving traditions. Therefore, this examination of Philippine traditional textile preservation is guided by the unique fibre production in each region, and the associated knowledge and skills with each cloth. Practitioners know the characteristics of the fibre they have traditionally worked with and articulate practices by and large associated with a fibre type and not a costume or weaving type.

What is true is that the local knowledge regarding textile preservation is essential to and part of maintaining the aesthetics and significance of certain textiles. Traditional knowledge among expert weavers is key; weavers know exactly how to take care of their woven textiles. It is clear that throughout the Philippines, those different textile materials require different treatments; what is effective to one may be damaging to another. For instance, cotton textiles may be washed using commercial detergents, which are not applicable to the very delicate *piña* (made from pineapple, *Ananas comosus*, Table 2) and *abacá* (made from *Musa textilis*, a variety of banana native to the Philippines) cloths. It seems that many of the interviewees are conscious of the importance of using natural ingredients to preserve the textiles, as they are safer for the people and the environment. Moreover, the beliefs and practices associated with textiles, including methods to preserve the fibres, cloth and its designs, are vital to them as reflections of their culture and identity.

Fibres from the leaf stalks of the *Musa textilis*, a species of banana native to the Philippines, are used to make the traditional *abacá* cloth known as *t'nalak* among the T'boli of South Cotabato.
(Source: National Museum of the Philippines)

Methodology

A total of 22 informants were interviewed in different parts of the Philippines. They were composed of expert weavers, designers, dyers, embroiderers, sewers and collectors of handwoven textiles from commercially available threads and locally processed plant fibres. Textile materials included in the research are cotton in Benguet and Zamboanga City, *piña* or *pinya* in Aklan and Laguna and *abacá* in South Cotabato. These locations were selected for their textile traditions and expertise in dealing with a particular tropical fibre. There is very little available local literature that focuses on traditional knowledge on the preservation of Philippine textiles. Most publications address different kinds of weaving processes, and their socio-cultural significance. Therefore, this study is based chiefly on the interviews and cross-referencing, and the methods documented herein are still in use to this day.

Cotton Textiles

Cotton threads are one of the most common materials found in the market today. Most weavers in many parts of the country utilize commercially produced cotton threads in weaving traditional textiles; among them are the following ethnic groups: the Ibaloi of Kabayan (Benguet Province, northern Philippines) and the Yakan of Zamboanga City (southern Philippines). They usually hand-wash their textiles with locally purchased laundry detergent. In dealing with stains, the Yakan weavers soak the textile first in water with the commercial detergent for 30 minutes before washing it; tough stains are removed by applying bleach to the stains; and more specifically toothpaste is used for ink stains. On the other hand, the Ibaloi did not comment on stain removal in their woven textiles. To repel insects, both groups cited the use of mothballs inside cabinets and drawers where textiles are stored.

Based on discussions with researchers in the Ethnology Division of the National Museum, the Ilokano in Ilocos Region used *almirol*, a water and *gawgaw* (cornstarch) concoction, when rinsing their washed handwoven cotton textiles called *abel*. The *almirol* stiffens the fabric and acts as a sizing or fine shield, so the dirt will not penetrate the textile. This makes the removal of any stain easier when washing (stains are repelled and tend to sit on surface and not penetrate the fibres). To restore the whiteness to a yellowing white textile, it is submerged in a mixture of water and indigo powder (*añil/anyil* or more popularly known as blue or *kolór* in retail stores, and known globally in historical laundry practices as "blueing"), left in the sun and rinsed the following day (this is known as sun bleaching for white fabric). Tough stains like blood or rust are treated with a strong local citrus called *kalamansi* (*Citrofortunella microcarpa*, Table 3) and salt.

Piña Fabric (Pineapple Fibre)

Pure *piña* and *piña-seda* fibres (a combination of *piña* as weft and *seda* or silk as warp was developed in 1992 due to the scarcity and increasing cost of *piña* fibres) are woven in the province of Aklan in central Philippines. Handwoven *piña* (or *piña-seda*) cloths are traded to other parts of the country for embroidery embellishment. For instance, weavers in Aklan supply *piña* cloths to the embroiderers in Lumban, Laguna in the southern Tagalog region. They are very special and expensive, unquestionably the most famous cloth from the Philippines and known around the world. Therefore, there are exacting and age-old care guidelines practised by Filipinos in and out of the country. According to the weavers and embroiderers, *piña* cloth is usually cleaned by gentle hand-washing in lukewarm water with mild soap; it should never be scrubbed or squeezed because of its extreme fragility. To maintain the whiteness of the cloth, the bilimbi fruit (*Averrhoa bilimbi*, Table 3), known locally as *kamyas/kalamyas* in Tagalog and *iba* in Aklanon, is added to the soapy water; fresh pineapple juice is also used. The garments made from woven *piña* cloth, such as the *barong tagalog* or long-sleeved male upper garment, are intended for official functions and special occasions. These garments are also treated with *almirol* (starch) before ironing to add luster to the clothes and prevent stains from penetrating. The use of *almirol* is a preventative conservation method, a sizing to protect the clothes and repel stains from penetrating;

Ms Magdalena Rosales embellishes the plain woven *piña-seda* (pineapple-silk) with traditional embroidery in Lumban, Laguna. (Source: National Museum of the Philippines)

Fresh juice from the pineapple fruit can be used in the cleaning of piña cloth. (Source: Lyn Liza Silva)

therefore, it is a traditional method of textile preservation. It is not a cleaner, but a stain deterrent. However, applying *almirol* is not advisable when storing *piña* cloth, as the starch attracts insects.

The embroiderers of Laguna put roots of *moras* or vetiver grass (*Vetiveria zizanioides*, Table 4) and pandan leaves (*Pandanus amaryllifolius*, Table 4) inside cabinets for insect mitigation. In urban areas and museums, Japanese paper and silica gel are used to reduce the moisture when packing and storing *piña* cloth. Among the *piña* weavers of Aklan, they believe that the fibres should be arranged in the loom during high tide because low tide is deemed as negative in terms of production; the presence of pregnant women near the loom is believed to increase productivity; a mosquito net should be placed on the loom while weaving so the fibres will not break.

Moras (vetiver) roots are placed inside cabinets to deter insects. (Source: National Museum of the Philippines)

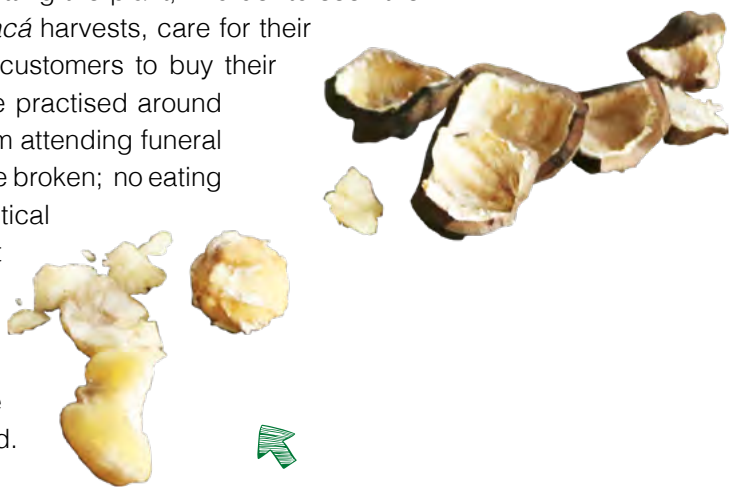
T'nalak or Ikat-dyed *Abacá* Cloth

Among the T'boli of Lake Sebu, South Cotabato, southern Philippines, fibres from the leaf stalks of the *abacá* plant are extracted and woven into cloth locally known as *t'nalak*. The designs of this ikat-dyed handwoven *abacá* cloth appear in the weaver's dream. Some traditional preservation methods of *t'nalak* are integrated during its entire production as preventative conservation. Here, the practicality and age-old wisdom of textile care is distinct.

Elder Subi Nalon transmits the knowledge of producing and caring for *t'nalak* ikat-dyed abacá cloth to her daughter Ellen Duwang in Klubi, Lake Sebu, South Cotabato.
(Source: National Museum of the Philippines)

The method of knotting the *abacá* fibres together guarantees that the fibres will not be disconnected. To ensure the *t'nalak* preserves its colour, fibres are dyed naturally for long periods; the fibres are cooked in ash lime mixture that act as bio-mordant before dyeing the fibres red. Handwashing with plain water maintains the organic composition of the *t'nalak*. Air drying the fibres and textile in the shade is a common practice; the sun will make it fragile. Washing the *abacá* cloth in a mixture of ground candlenuts or *byo-u* (*Aleurites moluccana*, Table 3) and water, obtaining a slightly oily solution, makes the cloth pliable and shiny. Another enhancement method is "calendering", which involves pounding the cloth to make it soft, and shining or burnishing it with cowry shells.

Overall, every step in *t'nalak* production contributes to maintaining its durability or to enhancing its beauty. Interestingly, beliefs and practices associated with the *t'nalak* refer mostly to its preservation. Important garments such as *malong* or tubular skirt, necklaces and belts, together with prayers, are offered to the *abacá* spirit named *Fu Dalu*. This is done before cutting the plant, in order to seek the spirit's favour for many needs: to provide good *abacá* harvests, care for their well-being, enhance the designs, and draw more customers to buy their *t'nalak*. Some of the superstitions or beliefs that are practised around *abacá* weaving include: the weaver must refrain from attending funeral wakes while weaving because the *abacá* fibres will be broken; no eating near the weaving in process (perhaps for the practical reason that morsels of food would attract insects that may infest the textile); at the start of weaving, the maker must refrain from harvesting vegetables to prevent the threads from snapping; and the weaver must avoid eating shrimp and fish while weaving, otherwise the designs will become distorted.



Ground candlenut (*byo-u*) is mixed with water to wash *abacá* cloth fibres as a preventative technique.
(Source: National Museum of the Philippines)

T'nalak cloth is rolled with a cotton fabric for safekeeping in baskets and/or cabinets (Source: National Museum of the Philippines)

INTERVIEW HIGHLIGHTS

Yab Man

58 years old, Weaver
Sitio Lamkua, Barangay Klubi, Lake Sebu, South Cotabato

T'nalak weaver Yab Man acquired her skills from her great grandmother, starting at the age of 15. She has continued to gain knowledge on traditional textile care and preservation throughout the years and has passed it onto her daughters and other apprentices in their community. According to her, the finished cloth is only cleaned as needed by handwashing in running water for a maximum of ten minutes. She noted that this process does not only make it clean but also helps to make it soft. They avoid using detergents in order to preserve the design and colour of the cloth. She also uses organic dyes and substances in processing the fibres. At present, *t'nalak* has become a primary source of income for her family. Her finished products vary in terms of designs and length depending on the demands of customers. She also weaves commercially dyed *abacá*, which is relatively cheaper than the naturally dyed woven cloth.

Subi Nalon

790 years old, Weaver
Sitio Lamkua, Barangay Klubi, Lake Sebu, South Cotabato

T'nalak weaver Subi Nalon started weaving at the young age of 12 and has taught her five daughters the entire process of weaving *abacá* cloth. She is a master weaver. According to her, cleaning the finished *t'nalak* involves handwashing in plain water; pounding the cloth using a wooden beater, called *bagol lebag*, until it becomes soft; and air-drying by hanging the cloth inside the house. Ironing the cloth using *saki* or cowry shell also helps to remove the surface dirt and makes the cloth shiny. She mentioned using *talo* or beeswax and *kebulay*, a black waxy substance produced by the insect called *ngetemusan*. During the process of tying the fibres to produce ikat designs, these organic stuffs were applied to the fibres to allow the plastic straw bindings to stick tightly on the fibres. Sadly, she passed away on 16 January 2017, eight months after our interview.

Conclusion

Traditional knowledge about the preservation of textiles is still being practised today and has been proven effective in many communities with long-standing textile weaving traditions. All the interviewees hope that their textile production, together with the associated knowledge, beliefs and practices, will continue to flourish through future generations because textile production is a significant aspect of their culture and identity. It is evident that they are proud of their culture and believe theirs is a contribution to the nation at large; this is why they continue to transmit their knowledge to the younger members of the community. Furthermore, handweaving has been, and is still, the major source of income.

These traditional knowledge and practices need to be applied to the professional level of textile conservation in museums because it is more sustainable than chemical-based materials, is not harmful to the conservators and is eco-friendly too. Instead of investing in conservation chemicals, research into preservation techniques using plant materials for cleaning and insect mitigation needs to be encouraged. The lack of publications on traditional preservation techniques of Philippine textiles makes this initial research very important. As conservators and stewards of our heritage collections, continuous research on alternative preservation practices, particularly proven traditional ones, and publishing it will allow us to discover more of this intangible cultural heritage among traditional communities, which we can utilize to preserve our collection.

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SITI SUHAILAH SALIM

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Siti is an assistant conservator with the Heritage Conservation Centre (HCC), National Heritage Board (NHB) Singapore. She started working with HCC in 2006 making textile mounts and carrying out conservation work for NHB museums and HCC. She has worked on several exhibitions, including the preparation of Peranakan costumes for travelling shows to museums in Japan and China.

Armed with a Diploma in Fashion Design from Nanyang Academy of Fine Arts and her vast experience in mount making, Siti often shares her knowledge and skills with new HCC textile conservators to equip them with the necessary mounting skills. She has also piloted training workshops to teach non-conservators the skills in making mounts for textiles and garments for NHB institutions. To further develop her mounting skills and experience, she completed a 6-week of internship with the textiles conservation team in the Victoria & Albert Museum, London, in 2015.

SINGAPORE

Siti Suhailah Salim

Introduction

Singapore is a very developed country with rapidly changing and massive urbanization; the traditional customs that characterized the island prior to and just after WWII are all but gone. Modernity is why many people choose to reside in Singapore. People are grateful for the conveniences that come with modern technology, and the daily dominance of technology and modernity has erased the traditional crafts and ways of doing things. Many of these customs were not passed down, and now mostly forgotten and lost. The younger generations of Singaporeans have no recollection of using any natural plant materials for clothing care, or even seeing their grandparents using them. It could also be that the younger generation does not have much interest in practising these traditional methods of doing things. Using plants and herbs to care for textiles and garments is cumbersome, when modern conveniences such as detergent in a bottle, washing machines and insect repellent are readily available. Moreover, most Singaporeans live in apartment buildings with restricted space to grow plants. Even though Singapore has one of the most extensive botanic gardens in the world, access to natural materials is limited.

Methodology

Because of the lack of broad traditional customs, not much data was obtained first hand. While 10 people were interviewed, only 3 provided historical information. Research was primarily academic, through journals, books, printed and photographic references. This research led to three very interesting living examples of traditional textile care: an elderly Peranakan man, a Singaporean woman who recalled her childhood in the 1960s, and the vanishing laundry trade (Zaccheus 2013) by the Indian dhobi ("dhobi" is derived from the Hindi term which means "washer man").

Traditional Laundry Business

Today, there is only one Indian dhobi shop left in Singapore. The P. Suppiah Laundry shop was started by Tackiri Suppiah and has been in operation for over 50 years. He came to Singapore from South India in 1947 and started working for his cousin who was already running a laundry business. He vividly remembered that the laundry process was done by hand and he used the traditional method of boiling water with firewood to steam the dirty clothes. This steaming process was to help remove dirt from the clothes. Blue cleaning agent (possibly laundry detergent with optical brighteners or blue dye) was used to make clothes visually brighter, and starch was for easy and elegant ironing. Back

P. Suppiah Laundry and Dry Cleaning, Singapore's last Indian dhobi, located on St George's Road.
(Source: National Heritage Board)

then, washed clothes were dried out in the open fields or hung on ropes. Now Suppiah's son, Ari Valakan, is the proprietor. These days, the clothes are soaked in detergents and soaps using industrial appliances such as the washing machine and dryer.

This traditional method of laundry business by the Indians in Singapore can be traced back to the mid-19th century. After Singapore was established as a British trading post in 1819, the settlement attracted an amazing number of immigrants from China, India and Malay archipelagos. By 1830, the population had grown to more than 17,000. People came to Singapore for trade and work, bringing with them their goods, traditions, knowledge and skills. Some of the Indian immigrants belonged to the "*dhobi*" caste, whose traditional occupation was to wash clothes. They quickly organized, collecting soiled laundry from door to door, and returning them washed and ironed. Washing took place along the river banks. Clothes were rubbed and flogged against stones to remove dirt before rinsing them. This activity was focused on the banks of the Sungei Bras Basah (a misspelling of "sungei beras basah", meaning "river" and "wet rice" in Malay), also referred to as "*Dhobi Ghat*" ("*ghat*" in Hindi refers to a series of steps leading to water). Today, the *Sungei Bras Basah* is known as the Stamford Canal. It is located next to the Istana (the President's official residence and office, meaning "palace" in Malay), and the nearest Mass Rapid Transit (MRT) station has been appropriately named "Dhoby Ghaut Station".

It is not known if any natural soap materials were used in the laundering process. After washing, the laundry was laid out to dry in the open lawn by the Sungei Bras Basah. The grass and sunshine would readily promote natural bleaching. Flogging on stones was a traditional method that the Indian *dhobis* practised in their home country and is still practised in India. Mahalaxmi Dhobi Ghat in Mumbai, India, is the largest open air laundromat in the world and the washers still employ the same method to wash clothes. The traditional method of doing laundry may not have originated in Singapore, but the Indian immigrants brought with them the tradition and skills that were adopted and used locally.

Traditional Laundry Methods at Home

Not much is remembered of how our grandparents preserved and cared for their textiles. It seems that the traditional ways of laundering or using natural material is insignificant, and inconvenient. But not for Peter Wee, a Baba Peranakan (locally-born male descendant of Chinese heritage) in his seventies. He still recalls 50 years ago how textiles were taken care of in his home. Papaya (*Carica papaya*, Table 5) leaf was used to clean clothes, before being replaced by soap. The leaf was first mashed in water, and only the water was used for the washing. Banana leaf, another natural material, was interleaved between the starched cloths and the hot iron to prevent the cloth from burning. He also remembered his mother's garments were perfumed by smoking it with incense before being worn. Smoking the garments also helped to keep the pests away. Another method of repelling insects was by scattering or placing peppercorns (*Piper nigrum*, Table 4) and basil leaves (*Ocimum basilicum*, Table 4) in the wardrobe.

Records and recollections indicate that laundry was done at home, by hand, with a wooden washboard and brush, and a big soap bar, which came in a big slab and was cut into smaller pieces before use. Some of the common brands were Fab and Labour, which are still available in the market today (Labour soap is produced by Lam Soon, a Malaysian company which started in 1958 to produce cooking oil and soap). Laundry was done either at home or in a communal area with a water source, such as by a river, well or natural spring. Rain water could also be collected to use for laundering. There appear to be other home remedies for stain removal, using ingredients easily found in the kitchen, such as cooked rice, salt, vinegar, lemon juice and baking soda to name a few. Depending on the type of stains, these ingredients can be effective, non-toxic and low-cost. Home laundry also included the process of starching and pressing, especially school uniforms! White cloth such as for school uniforms and white bed linen were dipped in *nila* (indigo water) solution to make the fabric appear whiter. Today, it is all done in the machine, or by the commercial dry-cleaner; starching is done with a spray, and detergents have optical brighteners for whitening.

Author's preparation of papaya leaves mashed in water, as recalled by Peter Wee, a Baba Peranakan in his seventies.
(Source: National Heritage Board)

Conclusion

Most of the cleaning materials and practices used for the last 50 years are chemical and mechanized, rather than traditional. Or rather, that is the tradition. The use of older plant-based materials, such as Peter Wee's papaya leaf, were phased out long ago, with the availability of easy-to-use and effective commercial soap bars. Ari Valappan of the P. Suppiah Dhobi shop foresees that his children may discontinue his *dhobi* business in the future. The prevailing lack of interest, pride and awareness to preserve the traditional methods of caring for textiles and garments will lead to the last of these trades and knowledge to vanish very soon.

Further research on traditional methods and the use of natural materials for storage, insect mitigation, cleaning and stain removal can include the Chinese laundry shops run by the Shanghainese and Cantonese immigrants, and the Singapore Steam Laundry company in the 1920s. These too are part of the history of textile care in Singapore. Whether or not this knowledge of the past can improve our current preservation practices in a more sustainable manner is questionable, but it does enhance our cultural understanding and reinforce our identity as historic Singaporeans.

INTERVIEW HIGHLIGHTS

Peter Wee

in his seventies
President of the Peranakan Association Singapore and Antique Collector
Katong Antique House (East Coast Road)

Mr Wee is a fourth generation Baba Peranakan. He observed how his mum's sarongs and kebaya were taken care of at home. He is the eldest of the respondents and is the only one who could recall using natural materials such as papaya leaf for laundering. He also remembered that washed clothes were starched, and white bed linen and school uniforms dipped in nila (indigo dye) to make them a brighter white, and ironing was done using a banana leaf interleaved between the cloth and iron.
In preparation for a night party, he vividly recalled that the garments were laid over a furniture or chair in the morning and were left to be perfumed –- smoking it with setanggi (incense). Peppercorns and daun kemangi (basil leaves) were placed or scattered around in the wardrobe to keep the insects away.

No other respondents could remember using any of these natural materials.

Mrs Loh

in her sixties
Housewife, Mrs Loh's daughter, Jacinta Loh, a textile conservator, replied on her behalf through email

Mrs Loh relates doing laundry when she was very young in the 1960s. Laundry was done by the river, in a communal area where there was natural spring water flowing from Bukit Timah Hill [this place is now known as Hindhede Nature Park].
In those days, the colour of the clothing was either white, blue or black. Washing was simply done using water – detergent was not used.
She remembered using soap later on in her teenage years and she still uses the same brand, Labour, for specific laundry.
Some of the tools used for her laundry included a brush, a wooden washboard and a wooden beating tool.

The well-to-do families had their clothes laundered by the laundry services.

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NUCHADA 'JOY' PIANPRASANKIT

Conservation Department
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Joy graduated with a BA from the Faculty of Archaeology, Silpakorn University, Thailand. She started her career at the Queen Sirikit Museum of Textiles in 2011, as a gallery guide, and joined the Conservation Department. She was trained by the museum's senior conservator consultant, Ms Julia M Brennan. In the field of textile conservation, she works on executing exhibition work, storage and preventative conservation. She is the key researcher in the department, doing field work for the "Before They Are Gone" traditional methods and materials pilot project, and chemical research on saponin and cleaners.

THAILAND

Nuchada Pianprasankit
Julia M. Brennan

Introduction

Thailand was selected as the first country to conduct the pilot project on collecting traditional methods in textile preservation to establish the methodology for the larger Southeast Asian research. This allowed for a period of research spanning two years to test and build the overall project, and the close collaboration between the Queen Sirikit Museum of Textiles (QSMT) and the Southeast Asian Ministers of Education Organization Regional Centre for Archaeology and Fine Arts (SEAMEO SPAFA). Thailand is also an example of a robust blend of both rural and urban development, with enormous technological and agricultural advances since the 1960s affecting how everyday people live. In spite of mass mechanization, Thai rural life in particular still embraces some of the old traditional customs, beliefs and associated resources. For example, in Phrae Province, according to the interviews, about fifty to sixty years ago, clothes were made by women for their family. Each community usually grew cotton plants for making cloth. The process of making cloth was also combined with dyeing, weaving and tailoring. Cleaning and preservation methods were taught by older generations to younger generations. Thailand shares similarities with other Southeast Asian countries such as Vietnam, the Philippines, Malaysia, Indonesia, insofar as all have undergone intense modernization over a short time frame, yet still uphold a foundation of traditional religions and practices. Today is thus a blend of the old and new, but with the old rapidly disappearing.

Informants in northeastern Thailand.
(Source: Queen Sirikit Museum of Textiles)

Methodology

The data set is based on sample collecting, in-person interviews, a customized questionnaire, photography and short film clips with 20 people in rural villages, urban areas, and two women from the royal court. Interviewees come from four rural villages, and three categories of urban communities: the royal court, professional weavers and private collectors. There are 20 informants; 16 female and 4 male, with the average age between 45-65 years old. Data is from four locations across three different geographic regions and climate zones: the north, northeast, and central south Bangkok areas. Fibres include silk, cotton and synthetic cloth.

QSMT and SEAMEO SPAFA staff interviewing Ms Pranom Thapang, awarded National Artist by the Ministry of Culture in 2010, in Phrae Province, Thailand. (Source: Queen Sirikit Museum of Textiles)

The data topics in the Thai pilot project are broader in order to establish the various sectors of preservation data to be applied as guidelines in the project's research endeavours henceforth.

The eight data topics and groupings include the methods and materials of:

1) insect mitigation
2) rodent mitigation
3) storage methods
4) wet-cleaning
5) stain removal
6) repairs
7) general care or enhancement of textiles, such as pressing or perfuming
8) local beliefs, superstitions and family practices.

Locations and informants:

- Phrae, an indigo-dyeing village in northern Thailand and a local cultural centre where a renewed sense of community identity has grown from the revival of traditional methods and materials. Data was collected on textile preservation practices in three districts: Mueang Phrae, Long and Wang Chin, among the Tai Yuan, Tai Phuan and Karen communities. (7 interviews)
- Buriram and Na Pho, two ikat weaving villages in northeastern Thailand close to the Cambodian border, where the elders actively weave and use traditional practices of textile preservation. (6 interviews)
- Kalasin, Surin, two silk weaving villages in northeastern Thailand, where the old techniques of brocade and discontinuous supplementary weft weaving are practised. (4 interviews)
- Court-trained women in Bangkok, who teach and practise traditional royal embroidery. (2 interviews)
- Bangkok-based professional weaver, from Chitralada Palace. (1 interview)

Summary of Rural Practices

All the rural women interviewed are weavers or dyers, and learned their skills from elders, starting at a young age. Five of the villages visited are under the patronage of Her Majesty the Queen and have a secure and targeted market for their products, practising weaving for a living either part-time or full-time. Phrae was a major focal point of research, with access to tribal groups, dyers, weavers and textile collectors. Most of the data from Phrae concerned the preservation of cotton, while from the northeast it focused on silk. Most of the women are not conscious of their preservation practices or those of their mothers or grandmothers. Most data was gathered from "retrospective interviews" in remembering "past practices". Today, women seem to clean, store, repair and protect their cloths "out of habit". In rare cases, some use selective traditional methods and practices for convenience, such as dried peppercorns (*Piper nigrum*, พริกไทย / prik thai, Table 4) as an insect deterrent. Mostly, they have adopted more efficient methods, such as using commercial cake soaps, Sunlight brand for example, and even washing machines.

There is a clear distinction between the care of everyday cloths and special cloths. Although the cleaning of special and silk cloths is infrequent, certain traditional treatment practices seem to still be in use, and cited (although not observed). For example, 50% of interviewees use some sort of traditional material, such as the water used to rinse rice (*Oryza sativa*, น้ำซาวข้าว / nam sao khao, Table 2) to rinse silks. Seventy percent use the water from old coconuts (*Cocos nucifera*, น้ำมะพร้าว / nam ma prao, Table 2) to rinse, soften the silks and remove the sericin. These plant materials contain low alkali, are soft and traditionally used as mild cleansers for the face and body. In general, silks are treated differently, washed rarely and sometimes inside out, and aired. In rare occasions, women might use a saponin, but this was not observed.

Two elderly informants from a Karen village in Phrae Province, Thailand, said they washed their textiles in the nearby stream and remove stains by turning the garment inside out and beating the stain out on a rock. A damaged garment is not repaired, and instead tied around the trunk of a tree based on the belief that it will bear more fruit.
(Source: Queen Sirikit Museum of Textiles)

Handwoven clothing that is everyday wear is cleaned with commercial soaps, hung on bars or in cupboards and used until it wears out. Traditional materials cited by rural women for cleaning cottons include four plant materials that are all saponins:

1. มะเขือแจ้เครือ (makhuajaekruea): *Securidaca inappendiculata / Securidaca bracteata* (Table 1)
2. Soapnut / มะซัก (ma sak) / มะคำดีควาย (makham dee khwai) / ประคำดีควาย (prakham dee khwai): *Sapindus rarak* (Table 1)
3. ขี้หนอน (khee nhon): *Zollingeria dongnaiensis* (Table 1)
4. fenugreek / ลูกซัด (luuk sat): *Trigonella foenum-graecum* (Table 1)

Securidaca inappendiculata / *Securidaca bracteata* (มะเขือแจ้เครือ/makhuajaekruea, Table 1) from the Karen village in Phrae Province, Thailand. (Source: Queen Sirikit Museum of Textiles)

Wooden chest made of camphor wood used for storage, found in northeastern Thailand. (Source: Queen Sirikit Museum of Textiles)

Removal of stains from cotton includes these same saponins, as well as more caustic materials, such as:

1. Lime / มะนาว (ma nao): *Citrus x javanica / Citrus x notissima / Citrus × aurantiifolia* (Table 3)
2. Kaffir lime / มะกรูด (ma krut): *Citrus hystrix* (Table 3); kaffir is a natural bleach used to remove tough stains, and it is said that one kaffir lime tree has enough limes to keep all the houses and families clean
3. Burned shells / หอยกาบ (hoikaab): *Phylloda foliacea* (Table 3)
4. Tamarind / มะขาม (ma kham): *Tamarindus indica* (Table 3)

By and large, these practices are not in use.

It is evident that most of the interviewees, weavers and dyers, bring their innate wisdom of plant compounds and their characteristics to the cleaning and care of their textiles. They cannot explain 'why', but they know how an acid or alkali will react with silk or cotton. They are, in fact, in tune with chemistry and the climate, knowing how humidity or sunlight (ultraviolet rays) can adversely or advantageously affect a certain plant material's potency and reaction. For example, the chance of mould can increase when collecting the silkworm cocoons, so this task is not done in the morning when the dew remains on the cocoons. Similarly, mould can occur on the warps when applying starch for strengthening them, so the warps are carefully rinsed with an alkaline solution. These informants are familiar with a range of available easy-to-use plant materials and use them for cooking, medicinal purposes, holistic and preventative health care, and religious ceremonies.

Special cloths of both silk and cotton are stored in a variety of methods. The most common storage choices are a cupboard or a wooden chest made of camphor wood, which contains compounds that are anti-corrosive, anti-microbial and anti-fungal. Textiles today are often stored in a plastic bag, the most easily available wrapper. Some methods of insect mitigation cited are various herbs placed around the storage area or in small cloth sacs adjacent to the cloth. These include readily available materials, some used for cooking, such as black/white pepper (*Piper nigrum*, พริกไทย / prik thai, Table 4), crushed chili pepper (*Capsicum frutescens*, พริก / prik, Table 4), camphor (*Cinnamomum camphora*, การบูร / karabun, Table 4), vinegar (acetic acid) and tobacco (*Nicotiana tabacum*, ยาสูบ / ya soop, Table 4). The nicotine in tobacco is a natural insecticide; the plant's dry leaves can either be used on their own or be distilled into a spray. Mothballs are also widely used, as they are readily available and inexpensive.

The most detailed historical data about rural preservation methods come from a master weaver and two textile collectors and historians who recognize the importance of preserving both old textiles and local heritage. Their accounts, while only vestiges remembered from their childhood in the 1950s and 1960s, provide a small window into obsolete rural practices. Of particular interest are the rituals to store and protect fine textiles for ceremonial use, cremation and the afterlife. One interviewee from the

northeast recalls his grandmother using materials that are typically Cambodian. Black glazed terracotta pots, clay jars for fermented fish and bamboo cylinders are three traditional storage devices. The bamboo is soaked in water or smoked to “preserve it” and to repel insects. Sacred and special textiles were often stored in unglazed clay pots with a double lip and a heavy sand lid, and sealed with beeswax. The funerary cloths themselves are pre-torn in one corner to indicate posthumously to the heirs that they are designated for funeral and cremation.

Summary of Court Textile Practices

Only the women of the inner courts took care of royal textiles. In addition to special cleaning, there are customs of perfuming and enhancing appearance. The only practices shared with rural women are the use of coconut water and rice water for wet-cleaning.

Care of textiles in the Thai court reveals a rich record of exotic plant materials and methods, extensive trade and an obsession with beauty. Interviews with two elderly women, who were trained in court techniques of textile care, provide a rare window into antiquated and obsolete practices, such as washing and ironing, glazing, pleating and perfuming. The summary of nine flower and plant extracts are evidence that they are also medicinal, used to alleviate headache, stomach ailment, digestive and many children’s and women’s health problems, and to make tonics and tinctures, as well as alluring fragrances. The ladies of the court knew their herbarium.

Traditional storage basket used for textiles made from wood and rattan on display at the Komol Antique Textile Museum in Long District, Phrae Province, Thailand (Source: Queen Sirikit Museum of Textiles)

Several cleaning methods were practised, depending on the textile’s fibre and use. Large silk brocade or painted cotton hip wrappers were commonly washed individually in water scented with sweet Madagascar jasmine (*Stephanotis floribunda*, ชะลูดช้าง / chalutchang, Table 2). Sticks or small paddles were used to agitate the textile and loosen the dirt. Fenugreek seeds were also added to the water, as a natural saponin for cleaning, and a gel for sizing. Fenugreek’s mucilage coating created a glossy finish, which was buffed with cowrie shells, agate, glass bottles, until the textile was glazed with a shiny finish. The more delicate breast wrappers and shoulder cloths received only gentle soaking in clean water. Delicate brocades, gold net and silk embroidered textiles were soaked in coconut water, rinsed in clean water and dried.

Perfumed cloths were stored in closed wooden boxes to preserve the fragrance and protect from insects and mould. Court women also scented their textiles by burning aromatics and creating perfumed waters and oils. These practices have all but disappeared, along with the myriad of other court practices.

Conclusion

The knowledge of traditional textile care in Thailand is rapidly disappearing. Today, few elders recall methods and materials employed by their grandmothers, and physical evidence of these practices is hard to find. This data is but a small subsection of a once rich culture of textile preservation techniques that will be fascinating to compare with the data from other countries in the region. It is particularly important as it directly informs Thai stewards of cultural heritage about their own material history, and now some of these practices are being actively adopted into present-day textile conservation practices at the Queen Sirikit Museum of Textiles, keeping the knowledge alive and evolving.

Mr Wuttikrai Phathong

Report includes contributions from Mr Wuttikrai Phathong (Kaewwanna Natural Indigo, Phrae Province, Thailand)

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INTERVIEW HIGHLIGHTS

Anukoon Detkard

21 years old
Student, Sung Men, Phrae Province, Thailand

Anukoon Detkard is a young weaver and dyer from Phrae Province. He grew up in a village that used to produce traditional textiles, and he learned weaving and dyeing techniques from the elders in the village. Being young and of the "social media" generation, he also searched for other information from the internet. His interest in weaving and dyeing stems from his awareness of and appreciation for cultural heritage.

From a young age, Anukoon wanted to be an expert male weaver and dyer, unique since traditionally it was a female practice. He works with cotton-based materials because they are easily accessible and affordable. He practises and experiments with dyeing by using local materials, e.g. indigo plants, ebony fruits (Diospyros mollis), mud, etc. He has collected his dyeing recipes, written them and combined them with yarn dyed samples. His work shows his creativity with dyeing techniques. Anukoon represents a younger textile producer that has a renewed and pronounced awareness of preserving cultural identities.

Lhamthong Sridu

46 years old
Weaver and Dyer, Bangkok, Thailand

Lhamthong is an expert silk weaver and dyer who works at the SUPPORT Foundation, Chitralada Palace, Bangkok. He grew up in a village in Nong Bua Lamphu Province, northeastern Thailand. His knowledge of weaving, dyeing and textile preservation was learned from his grandmother and mother. Lhamthong loves experimenting and innovating with dyeing and weaving techniques. Although his recipes and procedures have never been written, he can accurately recount his formulas and details. Lhamthong says that he is proud to be a weaver and dyer, and he very much wants to engage and teach the new generation so that they can preserve the indigenous knowledge for Thais.

Wassana Pumjampa

Entrepreneur
Chinat, northeastern Thailand

Since the age of 15, Wassana has learned about weaving and dyeing textiles from her mother. Now she works at Noen Kham community as a dyer. She also has her own textile business called "Pha Nai Fhan" (Textile in a Dream) which refers to the inspiration of her textile creations. She has her own textile collection, which includes local examples of indigo and lac dyed textiles, which she uses as inspiration and models for the traditional coloration and weaving patterns. Wassana has developed her dyeing techniques by experimenting, using local materials such as the outer-skin of the durian fruit, indigo, Indian trumpet tree, etc. Wassana is one of a few in the new generation who continues to practise as a dyer and weaver, and continues to improve and develop in her career.

TIMOR-LESTE

Claudio Marques Cabral
Fernando Sousa Lay

Introduction

Timor-Leste is a Southeast Asian country that is home to a vast diversity of traditions and customs and over 34 dialects. Traditional knowledge is one of the most important components of the culture; it is how the Timor-Leste people define culture. The innovations and practices of indigenous and local communities are strong and many, and are a part of the Timor-Leste character known to the world. This knowledge is gained over centuries, transmitted orally from generation to generation, taking the form of stories, songs, proverbs, beliefs, practices, rituals and material culture.

Timor-Leste is one of the youngest countries in the world, having gained its independence in 2002. The recent development efforts in the country (many foreign initiated) focus more on the educational, health and infrastructure sectors, while other traditions and ways of life remain continuous and essentially unchanged until now. The country's history and the stories of its peoples are some of the crucial aspects in nation building today. Scholars and citizens have been mobilized to study various aspects of traditional society, for purposes of national identity. The memories add up to more than just history; myths and stories are kept alive (Durand 2009). There are three principal myths for the East Timorese to remember: (1) the land of Timor-Leste came from the body of the crocodile, (2) dialects are a type of a string connecting heaven and earth (this has been confirmed by ethnolinguists) and (3) the majority of Timorese believe that they originate from abroad.

The presence of humans in Timor-Leste dates back to 42,000 BCE, and present-day Timorese take these roots into account in their understanding of historical evolution (Durand 2009). The traditional textiles of Timor-Leste are part of this continuum, having a significant value directly based on originality and sources. The research presented herein is one of the important ways of documenting the wealth of existing cultural expressions, in order to promote the culture of Timor-Leste and develop the tourism sector. In addition, this research will help to protect traditions that are fragile, sensitive to change and in danger of disappearing. This study explores the traditional knowledge and practices associated with the textiles of Timor-Leste, specifically of Lautem District.

Methodology

The focus of this research covers the communities of Tutuala Subdistrict in Lautem District, particularly the traditional owners and producers of *sica lau loiasu fanu*, the area's most sacred textile. The research is guided by a questionnaire and supported by photographs. Eleven people (nine women and two men) were interviewed in their homes and villages. Most are weavers, dyers and spinners, and three of the interviewees are "traditional speakers" for the community. The respondents' age group is between 60 and 70 years old; mostly elders. They all use traditional textiles, wear them, know how to identify and make them, and one person is a traditional dance instructor who utilizes textiles in her teachings. Many of the interviewees wanted to demonstrate spinning and weaving techniques and engage in very generous open discussions. All textiles referred to in the study are cotton fibre. Prior to fieldwork, the researchers also used resources in libraries, books, journals and the internet, to better understand the context and culture at large.

Findings

Concept of "Traditional Knowledge"

Traditional knowledge, as defined by the World Intellectual Property Organization (WIPO), "refers to the knowledge, know-how, skills and practices that are developed, sustained and passed on from generation to generation within a community, often forming part of its cultural or spiritual identity". The collection of data presented herein is viewed through this "lens" of traditional knowledge.

"*Sica Lau*" Textiles of Lautem

Tutuala is a subdistrict located on the eastern tip of the country, in Lautem District, where dramatic "rocky mountains meet the pristine sea"; it is believed to be one of the first places where the area's inhabitants arrived by boat (Soares 2015: 19). The people of Lautem say that traditional textile weaving is as old as the region itself and has sacred links to the world of their ancestors, which is passed down through traditional knowledge. In fact, the district's name "*Lautem*" is derived from two Fataluku dialect words, "*lau*" and "*teinu*" meaning "sacred textile" or, in the national Tetun language of Timor-Leste, "*tais lulik*". The typical textiles of the subdistrict of Tutuala are known as "*sica lau*", the most valuable of which is the *sica lau loiasu fanu*, traditionally only worn among the area's elite and featuring the "*loiasu fanu*" boat motif (Soares 2015: 20).

Sica lau are made from handspun naturally dyed cotton and are characterized by deep colours, stripe sequences and ancestral motifs. The design of traditional Lautem textiles comes from many sources and sheds light on aspects of history, the environment, living conditions and society, particularly family, hierarchy and community. Typically, the designs reflect the natural world, such as leaves, flowers and animals, as well as the ancient material world, such as the *keu* (ceremonial bracelet), *faria* (bell), *la furu* (stone stove) and *hualu* (traditional comb) (Howe 2009: 11; Soares 2015: 28). Other designs are considered sacred because of their specific link to the history of a particular family or location, such as the cloud, eagle mouth, horse, three boats and poria leaf (*Sterculia foetida*, the java olive tree, known in Tetun as "*ai nitas*"). The sacred *sica lau* of Tutuala are identified as belonging to a particular family line or name and are used for rituals such as weddings, funerals and the ancient "Voton" singing prayer ceremony. Voton is an ancient mariner's tale sung in Lovaia/Makua, one of the fast disappearing Fataluku dialects of Timor-Leste (Many Hands International 2015: 11).

One distinct example of the transmission of traditional knowledge can be seen through the Ili Kere-Kere rock art site in the subdistrict of Tutuala. Cloths examined in this fieldwork contain images of the natural and material worlds specifically related to the rock art images of the ancient site. The motifs of the cloth drawn from images of the rock art include *ma'ar lau hana asu hiape* (person in a boat) and *kuca hau ma'ar lau hana hiape* (person riding a horse) (Howe 2009: 11). The ancient story of the origins of Timor-Leste peoples is told in the rock paintings and then re-interpreted in the ritual textiles. As recounted by one interviewee, community elder Henrique da Cruz, the Fataluku people came to Tutuala by boat, leaving their homeland overseas to escape from fire and flooding; and the Ili Kere-Kere cave became the meeting point for the different *ratus* (groups) to engage in community decision-making on the distribution of land, activities and roles (Many Hands International 2015: 6). These textile motifs are still considered proprietary and sacred by the people of Tutuala. However, nowadays some of these motifs are found in other areas of Lautem, such as Com and Lospalos.

The most traditional Lautem technique, known as *sisirana* (ikat), uses resist-dye in single- or double-colour black and red stripes, and there are also other weaving techniques, such as the *porosana* tapestry weave, *rata hurana* supplementary weft wrap, *kei ilana/ sotis* float warp weave, *ter* supplementary warp and *pele* warp wrap technique (Soares 2015: 12). Most *tais* (textile in the national Tetun language) in this area are locally known as *lau sekuru* for a man's cloth and *tupurara hini* for a woman's cloth.

Materials

According to Soares (2015), Lautem weavers have historically produced exquisite *lau teinu* or sacred *tais* using handspun cotton and plant dyes, including *charunu* (indigo) for black, *nenuka* roots (*Morinda citrifolia*, noni fruit, Table 3) roots for red and brown and roko-roko heartwood (Caesalpinia sappan, sappanwood) for red and pink. The threads are dyed in the single- and double-warp resist ikat method. Resist-dyeing, known as *sisirana* or *futus*, is considered to be the most ancient and traditional of methods and is therefore highly valued (Soares 2015: 12). The drop spindle technique used to spin the cotton is practised by all the weavers, and is considered an expert manoeuvre that is time consuming, adding to the value of this specific skill.

Preservation

Traditional *lau* woven textiles are customarily stored inside a big square basket known as *poko* or *leu kaisala*, a big round basket made from the leaves of the *ai-kadiru* palm (*Borassus flabellifer* / toddy palm) (Soares 2015: 12). These baskets are in fact all-purpose. For example, they are also used to store seeds for planting. The textiles are folded and rolled, and packed into the baskets standing up. Tobacco leaves are placed inside the basket as an insect deterrent; and camphor may also be used to the same effect (Soares 2015: 12). To prepare the tobacco as an insect repellent, the fresh leaves are dried in the sun, then rolled into the textile and placed in the bottom of the basket. It is generally agreed amongst all interviewees that, traditionally, the lau are not and "cannot" be washed. They are "dry-cleaned" after use by drying them in the sun for approximately thirty minutes, as the exposure to sunlight helps to prevent mould on the cloth (Soares 2015: 12). One interviewee cited another technique using coconut to remove stains from traditional textiles. The process is as follows: 1) select the oldest coconut, 2) remove the husk and the hard inner shell of coconut, 3) cut the "meat" of the coconut in slices, 4)

chew slowly until the coconut is well mashed, 5) spit mixture onto the stain and brush slowly with the coconut husk. Marila da Costa, age 75, uses this technique and says it works effectively.

Conclusion

The practices, stories and imagination of the peoples of Timor-Leste are rich with knowledge from the world of the ancestors, expressed and told in the motifs of the textiles. This knowledge, the patterns, myths and skills to create the cloths have been passed down from generation to generation. Even the country's 27-year struggle for independence, which lasted until the beginning of the 21st century, did not destroy this ancient knowledge. Now, the development and protection of cultural heritage, both tangible and intangible, depends on nurturing and chronicling this ancient wisdom. It is the priority of the Timor-Leste government to develop activities, sometimes with the help of different nations in the world, to preserve the culture for the next generations. The textiles are complex, difficult to make, with multiple techniques and natural dyes. They have been cherished for their beauty and ritual importance, and wisely neither scrubbed nor aggressively or frequently cleaned. The understanding of material limitations coupled with ritual use have created a habit of mindful, minimal care, a sort of cautious hands-off approach. These methods are inherited from the ancestors, who have developed ways to conserve the traditional textiles, along with the associated beliefs.

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As head of the Conservation Department, Quyen's responsibilities include overseeing laboratory activities; training staff; supervising volunteers; engaging in preventive conservation of collection items in storage and on display of both indoor and open-air exhibitions; organizing treatment for exhibitions and external loans, undertaking management and administrative tasks, strategic planning, policy and budget, assessing preservation procedures; overseeing museum technicians, collections management and registration; and conducting research on conservation methods for artefacts of Vietnam's ethnic groups.

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VIETNAM

Dr Quyen Thi To Hoang
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Introduction

Vietnam, a multi-climate tropical country, is home to 54 state-recognized ethnic groups. More than half the region consists of dense tropical mountains, rich habitats for many plant species and raw materials, including the mulberry tree for sericulture and cotton. This diversity has traditionally supported a rich and unique culture of craftsmanship, including handweaving, basketry, embroidery, ikat, batik wax resist and beadwork. Most of the indigenous groups have their own traditional costumes for daily life, festivals, weddings and funerals. These costumes are often woven from cotton, linen and silk fibres, and indigo has long been used for blues, blacks and other colours. Today, with vast changes in commercialization, urbanization, and rapid transportation and trading networks, goods are exchanged easily throughout the country, including remote areas. Nowadays, people not only buy affordable mass-produced clothing, they also purchase commercial soap and detergent. Moreover, deforestation, loss of habitat, indiscriminate logging, coupled with the country's population boom, have rapidly contributed to the loss of native plants, fruits and traditional customs.

In traditional life, there were no chemical soaps or cleaning agents; ethnic peoples found many natural soaps from plants and the byproducts of rice cultivation, dyeing and wine production. They also created a variety of methods to preserve and store traditional textiles to keep them clean and durable. Today, the study and collecting of the traditional methods in textile preservation among Vietnamese ethnic groups is not only fascinating, but necessary. This source of knowledge on the traditional care of textiles is very precious, and now rare. Conservators and custodians of heritage in museums and universities can benefit from this knowledge, from the actual techniques and craft, as it can be applied to present-day conservation work. It is our responsibility as conservators to preserve the knowledge as intangible cultural heritage, along with the artefact.

Methodology

The first resources consulted were publications, including books, articles and online sources. However, information from these sources is limited, rather generic and ambiguous, and does not provide hands-on or detailed implementation processes.
Most of the research was conducted through interviewing people who live in villages. Interviews were done with the following groups:

1. Individuals who come to preserve the “Long House” of the Ede ethnic group at the Vietnam Museum of Ethnology
2. Thanh Hoa (Tai people)
3. Yen Bai (Tai people)
4. Hai Duong provinces (Kinh people)

It is important to note that all the information and data collected regarding traditional methods and materials presented herein are the result of “retrospective interviews”. All interviewees recalled recipes or methods, passed down orally through generations, and spoke about a bygone time; people no longer use these methods in their daily life, and the materials and techniques used to clean textiles have been lost. Therefore, it is challenging to obtain detailed firsthand knowledge about the actual plants, recipes, techniques, and their effectiveness. Much of the data obtained are “stories” and interviewees have not engaged in the documented practices.

Research results

Most traditional methods in textile preservation in Vietnam have been transmitted orally from generation to generation. Therefore, few publications refer to this topic. Preservation is briefly mentioned in a few studies on the history and anthropology of traditional costumes of various ethnic groups, such as an article about traditional costumes of the Choro ethnic group in Dong Nai Province. It mentions two ways to clean textiles; one is to wash textiles in streams, and the other uses the “thanh” plant (Hylocereus undatus, Table 1) as a detergent obtained in the forest. The thanh is a type of vine cactus, stripped and torn lengthwise to excrete a surfactant. People pounded the vine strips, rubbed them onto the clothes, rinsed these with water and dried them in the sunshine. The article also mentions the use of a stain remover made from the residue of rice wine, with clothes soaked overnight and then rinsed (Lam Nhan).

Washing and stain removal techniques:

- A majority of interviewees mentioned the use of bồ kết (Gleditsia australis, Table 1) for washing clothes. Even today, bồ kết is becoming more recognized as an extract for plant-based shampoos and cleaners. Its cleaning properties are therefore known, but people do not take the time to make the surfactant themselves. The most commonly cited method was to roast the long beans or seed pods, crush them in hot water to create a foam, filter out the plant matter to obtain a soapy water, soak and agitate the clothes in this water for about 30 minutes, and rinse with clean water.

- Also commonly used for washing clothes among the Tai, Tay and Kinh ethnic groups was “bồ hòn” (Sapindus rarak / soapnut, Table 1). The Tai and Tay would bury the fresh fruit in hot ash to soften the fruit, then crush it into water, filter out the fruit residue, and wash the clothes in the soapy solution. Kinh people mentioned the use of dry soapnut fruits placed in boiling water for hours or even overnight to create soap.

- Another popular method cited among many rural ethnic groups was to wash textiles in rivers and streams, a worldwide practice. They choose a place with deep and flowing water, and a flat rock for stretching out the clothes, gently beating and flattening them with a stick to dislodge the dirt from the fibres.

- Some dry-cleaning methods were also mentioned, especially by Hmong ethnic group who live high up in the mountains. Citing their living conditions in a mild tropical climate, their clothing does not soil as easily as those of lowland peoples. To clean clothes, they just air them out or expose them to the sun to dry, and use sticks to paddle off the dirt. This technique is used by other groups to “dry-clean” indigo and ceremonial clothing.

- A more caustic and stronger cleaner used primarily for white cloths or highly soiled durable clothing is rice stalk ash. It must be noted that this method can bleach the stains; it is an overall cleaner and stain remover. Ms Dieu Thi Xieng, of the Tai ethnic group, is dedicated to preserving her culture and practices and did a demonstration of this process. Here is her contribution to preservation: refer to the steps in the images below.

Preparing the banana leaf filter for the ash water.
(Source: Vietnam Museum of Ethnology)

Step 1: A basket is lined with several layers of banana leaf. The ashes from burned rice stalk are poured in and pressed tightly to the sides of the banana leaf wrap. An indentation is made in the centre of the ashes at the bottom.

Step 2: First, the water is poured in slowly, allowing ashes to absorb the water, with every drop of ash water filtered and flowing down through the funnel. The ash water is used for washing white-colour textiles, because it can bleach the stains that may have been stuck to the fabric for a long time. The textiles are then soaked for about 30 minutes.

Filtering the ash water through layers of banana leaves.
(Source: Vietnam Museum of Ethnology)

Soaking a textile in ash water.
(Source: Vietnam Museum of Ethnology)

Step 3: Soak textiles for about 30 minutes and rinse with water.

Step 4: Final rinse.

Betel leaves used for stain removal.
(Source: Vietnam Museum of Ethnology)

- Another stain removal method was recounted in Thanh Hoa Province, where the Tai people mentioned using betel leaves (Piper betle, Table 3) to clean stains and perspiration on clothes, and to increase the durability and fastness of the dye colour. Betel leaves are crushed in water, or sometimes boiled, and then used for scrubbing the stains off the clothing.

- In the past, some ethnic groups in Nghia Lo, Yen Bai Province, would plant "găng trắng" (*Catunaregam tomentosa*, Table 3) to form a fence around the home. The yellow fruit was sliced and used directly to remove stains on strong clothes.

- Another fruit used for stain removal was "ô rô" (Acanthus ilicifolius; Table 3). The cleaning method is very similar to the *Catunaregam Tomentosa* fruit. However, these species could not be located or obtained during the time of research and fieldwork.

Storage

Information on care of textiles was also given by interviewees. Some methods included wrapping textiles in dry banana leaves, covering them with plastic, and storing them in sealed wooden boxes or bamboo baskets in a dry place. Blankets or mattresses are placed in plastic bags and put in the eaves under the roof. Textiles were often hung by the fire to dry and smoke them, and prevent from mould development and insect invasion.

Conclusion

The tradition of historic textile preservation among ethnic groups in Vietnam is very rich and diverse, with strong evidence of the value and importance of textiles in rituals, ceremonies and daily life. People took advantage of the local plants and fruits using a variety of available materials, and used appropriate cleaning methods for each type of fabric. It is unfortunate, however, that most methods are not being practised. Hopefully, further research and the revival of these methods can develop in the future, so that other traditional methods can be found and recorded before they disappear from modern society.

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INTERVIEW HIGHLIGHTS

Ha Thi Tham

65 years old, Farmer and Weaver
Bon Don, Binh Son, Trieu Son, Thanh Hoa, Vietnam

Ms Man was a weaver as a child. In her memories, she has many details of weaving, spinning, yarn dyeing:

"With traditional textiles, never wash them with commercial detergent. If washed with detergent, the textile will get bleached, the dye colours will be lost. To dry-clean clothes, use sticks to beat the textile for the dirt and particles on the clothes to fly away. To preserve the dyes: Crush betel leaves in water, or boil the betel leaves, then throw the betel leaves and soak the clothes into that solution for several hours, rinse with water and dry in the shade. Washing clothes in the betel leaf water will protect them from insects. After washing, the clothes are folded and wrapped in sealed plastic bags and stored in a wooden box or wooden cabinets. In wet weather, clothes are easily mouldy. Hang the clothes in the kitchen near the fire to keep them dry, and the smoke will seep into the fabric and kill mould."

Dieu Thi Xieng

55 years old, Retired
Deu I, Nghia An Commune, Nghia Lo City, Yen Bai Province, Vietnam

Ms Xieng loves the traditional culture of her Tai ethnic group. She grew up in her village and has a lot of folk experiences in how to clean and preserve the textiles of Tai people. She talked about using the fruits of the *Catunaregam tomentosa* and *Acanthus illicifolius* plants to clean textiles, and gave a detailed demonstration of the use of ash water to clean clothes.

RECIPES & STORAGE

Wet Cleaning

"We don't wash our textiles". Most weavers say this when asked how they clean their traditional textiles. But when it comes to washing a textile, some plants can really help because they contain saponin, a natural surfactant. Many of the saponin plants also are antimicrobial and antibacterial (preventing mould and fungus), insecticidal (prevent insects) and even produce a good smell.

This list of plants has been traditionally proven as natural detergents (recipes applied for a single use).

Boiled soapnuts and removed pits.

Preparing soapnut concentrate.

Soapnut concentrate.
(Source: Queen Sirikit Museum of Textiles)

SOAPNUT (SAPINDUS RARAK)

1. Squeeze and mush with hands 10 fresh soapnuts into 1 litre of warm water. Then strain out fruit meat and seeds. (Meat and seeds are waste) The mushed fruit in water produces a soapy foam.

2. Add more water and soak the textile for 15-30 minutes.

3. Rub gently if textile is strong enough.

4. Rinse well with clean water.
   - If using dry soapnut, boil fruits first to soften the meat, so that it is easy to squeeze (fresh soapnut is soft and sticky, and easy to squeeze).
   - The older women of Java advise using 10 soapnuts per kain panjang (long cloth, approximately 250 cm long and 110 cm wide).

BỒ KẾT (GLEDITSIA AUSTRALIS)

1. Roast on fire one or two long seed pods of bồ kết. Crush the roast pods into hot water to obtain foam.

2. Strain out the fruit and seeds (waste).

3. Soak the textile in the foamy water for 30 minutes.

4. Rinse well with clean water.
   - Another method entails boiling the pods in water for 30 minutes, and using the solution to wash the textile.

bồ kết pods concentrate.
(Source: Queen Sirikit Museum of Textiles)

Bồ kết (Gleditsia australis) pods after roasting, boiling and manipulation for concentrate preparation

Baimee (Litsea glutinosa) leaves after boiling and manipulation for concentrate preparation

baimee leaves concentrate with added butterfly pea flowers for "bluing". (Source: Queen Sirikit Museum of Textiles)

BAIMEE (LITSEA GLUTINOSA)

1. Heat up 1 kg of baimee leaves in 2 litres of water.
2. Stir for 15-20 minutes. Solution will become slippery and foamy.
3. Strain out the leaves from the water. (leaves are waste)
4. Wash the textile in the slippery soapy solution.
5. Rinse well with clean water.
   - Butterfly pea (Clitoria ternatea) flowers are sometimes added to the mixture in Thailand, as the flowers' blue tint helps to make white clothes look whiter, a process called "bluing".

FENUGREEK (TRIGONELLA FOENUM-GRAECUM)

1. Heat up 1 kg of fenugreek in 2 litres of water.
2. Stir well until solution is slippery and foamy.
3. Remove from heat when the water changes to a light yellow colour.
4. Strain out fenugreek seeds from the water. (seeds are waste)
5. Wash the textile in the slippery solution.
6. Rinse well with clean water.

Filtering fenugreek seeds after boiling

fenugreek seed concentrate. (Source: Queen Sirikit Museum of Textiles)

ASH/LYE WATER MADE FROM RICE (ORYZA SATIVA)

Preparing the banana leaf filter for the ash water.

Filtering the ash water.

Soaking the textile. (Source: Vietnam Museum of Ethnology)

Ash/Lye water is a common method used for centuries to wash textiles and remove stains. In Southeast Asia where paddy fields are abundant, rice stalk is commonly used to produce ash/lye water.

Caution: This method is harsher, and can cause damage to delicate or colored textiles.

1. Burn a bunch of dry rice stalks to make ash.
2. Soak the ash in a bucket of water and let it sit for 2-3 days.
3. Filter out the ash.
4. Use the ashy-water as a natural detergent.
5. Rinse well with clean water.

Dry coconut palm fronds can also be used instead of dry rice stalks.

Stain Removal

Removing stains from textiles can be frustrating. Fortunately, nature comes with solutions. Here are some regionally available fruits that are good stain removers, thanks to their acid content.

- **Lime** (*Citrus x javanica, Citrus x notissima, Citrus x aurantiifolia*)
  Bilimbi (*Averrhoa bilimbi*)
  Kaffir Lime (*Citrus hystrix*)
  Lemon (*Citrus medica*)
  Noni / Cheese Fruit (*Morinda citrifolia*)
  1. Cut the fruit in half or squeeze juice from the fruit.
  2. Gently rub the fruit half or apply the juice directly onto the stain.
  3. Rub gently.
  4. Let it sit for a few minutes.
  5. Rinse well with clean water.

- **Thanaka** (*Limonia acidissima / Hesperethusa crenulata*)
  A lesser-known stain remover is from Myanmar. It is the bark of a tree called 'thanaka'. It is widely used in Myanmar, called a 'magic plant' and is applied as a face paste, body cream, and has other cosmetic and home uses.

Use a stone grinder (mortar) to produce paste from the bark.

1. Drop a small amount of water onto the grinder.

2. Rub the cut thanaka bark, back and forth on the grinder, until a creamy yellow-white paste is made. Add more water as needed.

3. Apply the creamy paste directly on the stain.

4. Let it sit for about 1-2 hours until dry.

5. Rinse well with clean water.

Thanaka paste preparation and thanaka paste applied to an oil stain.
(Source: Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture)

Storage & Pest Mitigation

INSECT REPELLING PLANTS AND SPICES (SELECTION)

Many herbs are used to repel insects. These are the most prevalently used throughout the Southeast Asian region according to the data.

- Fresh **soursop** (*Annona muricata*) leaves and **pandan** (*Pandanus amaryllifolius*) leaves can be put in small containers near the textiles.

- Dried materials such as **clove** (*Syzygium aromaticum*) studs, **peppercorns** (*Piper nigrum*), **chilli pepper** (*Capsicum frutescens*) fruit, **tobacco** (*Nicotiana tabacum*) leaves, and **vetiver** (*Vetiveria zizanioides*) root can hang near the textiles. Place herbs in a small cloth bag or mesh pouch near the textiles. The aroma of these spices will help keep insects away.

- To get rid of cockroaches, place a bowl of vinegar in the cockroaches' pathway.

STORAGE METHODS

Urban life and modernization have made the use of plastic bags and boxes the most popular forms of storage. However, among the rural and elderly inhabitants, some of the traditions described below are still in use.

Traditionally, there are several ways to store textiles. **Woven baskets made out of palm or pandan leaves** allow for air circulation and prevent mould growth. The textile can be folded or rolled to fit inside the woven basket, together with pouches of insect repelling dry herbs and spices (dried cloves, black peppercorns, tobacco leaves).

Woven "leu kaisala" basket made from toddy palm leaves (Borassus flabellifer) used in Timor-Leste. (Source: National Directorate of Museum, State Secretariat for Arts and Culture, Timor-Leste)

The Iban of Brunei (a Dayak people) store textiles in a **big clay jar** known as '*tajau*'. The textiles are folded and stored inside the jar, and the top of the vase is left open for air circulation. The jar is slippery, so the rodents and other pests cannot get to the textiles.

Tajau vase at the Iban longhouse in Labi, Brunei Darussalam. In addition to storing Iban textiles and other weavings, it is used to store dry foods. A true multipurpose storage system.
(Source: Hensona Anak Munah, Iban tribe member)

A common method is a wooden chest made of **sandalwood** (*Santalum album*) or **camphor wood** (*Cinnamomum camphora*) as it is believed to deter insects. The textiles may be folded or rolled, depending on the size of the chest.

Left: Chest made from camphor wood, used in northeastern Thailand.
Right: Cabinet made from sandalwood, used in Malaysia.
(Sources: National Textile Museum, Department of Museums Malaysia & Queen Sirikit Museum of Textiles)

Chart 10: Storage Methods

(a) Laos, Philippines, Thailand, Vietnam
(b) Brunei Darussalam, Indonesia (Bali), Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam
(c) Brunei Darussalam, Thailand
(d) Malaysia, Myanmar, Philippines, Thailand, Vietnam
(e) Brunei Darussalam, Myanmar, Philippines

DATABASE OF PLANTS AND METHODS USED IN TRADITIONAL TEXTILE TREATMENT

Database of Plants and Methods Used in Traditional Textile Treatment

This plants and methods database is part of a comprehensive work in tangible and intangible heritage documentation using ethnographic research methods. The plant data presented herein is one output of the overall study, and does not meet the criteria of academic standards in the field of botany (or ethnobotany); it is thus not a botanical study. While the nomenclature is accurate to the best of the organizers' knowledge, the following tables of plants are a rudimentary and basic exercise in documentation, with some scientific cross-referencing, but not comprehensive enough to meet botanical academic standards. We hope for this to be the beginning of a more detailed study in the future.

References for most data entries can be consulted in Appendix 5: Plant Database Bibliography in alphabetical order of the plant's scientific (Latin) name.

General observations on collected literature

It is interesting to note that a vast majority of the scientific articles collected for this database are written by Indian researchers and published in Indian pharmacology and biotechnology journals. Many of these articles present results on the phytochemical composition of plants used in Ayurvedic traditional medicine, in the aim to assess whether the medicinal use of these plants can be supported by science. The plants often undergo a saponin (frothing) test to detect the presence of saponins due to the proven efficacy of some saponins in fighting cancer cells, and are tested against various bacteria and fungi to assess antimicrobial properties. Given the similarities in climate and ancient historical relations between South and Southeast Asia, it is not surprising that many of the plants identified in this research project are commonly used in Ayurvedic medicine.

In regards to pest mitigation, much of the collected literature comes from pharmacology journals relating to tests on the efficacy of some plants in repelling mosquitoes (to control the spread of mosquito-borne diseases such as dengue fever and malaria); from stored product research journals (namely termite and rice weevil repellency); or from entomological and agricultural research journals concerning the protection of crops.

Another interesting observation is the considerable amount of resources found in commercial websites for naturally derived products, in articles written by enthusiastic bloggers on how many of these plants can be used as natural, environmentally friendly, do-it-yourself solutions, and in registered product patents for their use in skin and hair care, household cleaning and garden insecticide preparation.

Many of these resources follow a common thread in their objective, that is to provide sustainable eco-friendly alternatives to chemically synthesized pharmaceutical, cosmetic, household cleaning and agricultural products, and have been published fairly recently to reflect the growing and shared concern for the environment.

As this database is meant to be a work in progress, any additional plants, names in vernacular languages and scientific resources can be e-mailed to the organizers at spafa@seameo-spafa.org and info@qsmtthailand.org for review and consideration as additional data.

Table 1: GENERAL CLEANING (SAPONINS)

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Acacia concinna/ Senegalia rugata  	Mimosaceae	Tropical Asia	South and Southeast Asia, New Guinea, southern China; naturalized in Madagascar, Mauritius, Reunion	soap pod, shikakai (English), ကဗျုန်းရုကျ (Burmese), ສົ້ມປ່ອຍ (Lao), ส้มป่อย/sompoy (Thai),	Myanmar	fruit pods (dried)	Dry the bark, fruit pods and leaves. Grind into a paste. Mix with water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	Known as “shikakai” in India, this method is still widely used to make traditional shampoo, detergent and household cleaner in India. As a detergent for textiles, it is mainly used for silks and wools such as cashmere, as well as cotton. Scientific testing has proven the plant’s antifungal and antimicrobial properties. In northern Thailand’s Lanna culture, the pods are used to make holy water for merit-making ceremonies and as an offering to spirits.
Averrhoa bilimbi 	Oxalidaceae	Possibly tropical Southeast Asia	Cultivated in tropical regions	bilimbi, cucumber tree, tree sorrel (English), belimbing sayur (Indonesian), belimbing wuluh (Javanese), blimpi, calingcing (Sundanese), ໝາກເຟືອງ (Lao), belimbing buluh, belimbing asam (Malay), kamias (Tagalog), kamyas, kalamyas, iba (Aklanon), ตะลิงปลิง/taling pling (Thai), khế tàu (Vietnamese)	Indonesia	leaves	Squeeze leaves in water. Remove leaves. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	The fruits, leaves and petioles of the bilimbi contain saponin with antibacterial properties (Indonesia). In Malaysia, very acidic bilimbis are used to clean the blades of kris daggers. In Indonesia, its red flowers are used to make natural red dye for textiles.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Carica papaya 	Caricaceae	Mexico, Central America	Widely cultivated in tropical and warm subtropical regions	papaya (English), pepaya (Indonesian), katès (Javanese), gedang (Sundanese), ໝາກຫຸ່ງ (Lao), betik (Malay), papaya (Philippines), มะละกอ/ malakor (Thai), aidila (Tetun), đu đủ (Vietnamese)	Malaysia, Singapore	leaves	Mash and beat the leaf in water. Use the water for washing the cloth. Rinse with clean water. Dry in a well ventilated area.	Papaya leaves have antimicrobial and antioxidant properties, and are rich in saponin, producing a foamy lather when beaten or blended, thus making it a popular ingredient for homemade soaps, shampoos and conditioners.
Catunaregam spinosa / Catunaregam tomentosa *(formerly Randia tomentosa)*	Rubiaceae	South Asia	South Asia, Cambodia, northern Malaysia, Myanmar, Thailand, Vietnam	mountain pomegranate (English), หนามแท่ง/ nam thang), มะเค็ด/ ma khet (Thai), quả găng trắng (Vietnamese)	Thailand	fruit	<u>For silk:</u> Crush the fruit and mix with water. Remove the residue from the water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	The fruit can also be used as a shampoo, soap or toothpaste. In India, the fruit was traditionally used to wash wool fibre clothes. It has proven antibacterial properties.
Cocos nucifera	Arecaceae	Unknown (possibly Indo-Pacific region)	Tropical shorelines	coconut palm fronds ash (English), abu sabut kelapa (Indonesian), ຫມາກພ້າວ (Lao), abu pelepah kelapa (Malay), abo gikan sa sinunog nga lukay (Bisaya), ขี้เถ้าจากทางมะพร้าว/ khee thao jak thang maprao (Thai), nuu (Tetun), tro cành cây dừa (Vietnamese)	Malaysia, Singapore	palm fronds (dried and burnt to ash)	<u>For wet-cleaning</u> and bleaching white cloth: Burn the palm fronds to ash. Mix the ash with water and filter out the residue. Soak the textile in the filtered ash water overnight. Rinse with clean water. Dry in a well ventilated area.	It is also used to clean the fibre before the weaving process. Washing with ash/lye water is a caustic method. Proceed with caution as the calcium carbonate produced has a bleaching effect.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Curcuma longa 	Zingiberaceae	South and/ or Southeast Asia	Cultivated in South and Southeast Asia	turmeric (English), ຂີ້ຫມ້ີ (Lao), luyang dilaw (Filipino/ Tagalog), ขมิ้นชัน/ kamin chun (Thai), nghệ (Vietnamese)	Thailand	root	<u>For silk:</u> Use turmeric soap (widely available as an herbal soap in Asia) to wash the textile. Rinse with clean water. Dry in a well ventilated area.	Turmeric appears in some 'ecological surfactants' marketed in the USA and Europe, and is widely available as an herbal soap, shampoo and cleanser in Asia. Turmeric has antibacterial, antifungal and antioxidant properties.
Gleditsia australis 	Fabaceae	Vietnam, southeastern China (Hainan, Hong Kong)	Vietnam, China	bồ kết (Vietnamese)	Vietnam	pods (including seeds)	Roast the pods, then crush them in hot water to obtain foam; or, if not roasting the pods, place the pods in a pot and boil for 30 minutes. Filter out the residue. Soak the textile in this water for 30 minutes. Rinse with clean water. Dry in a well ventilated area. If the pods have been ground to a powder, it can be directly applied to the textile.	Citrus peel and other essential oils can be added to the water to produce a shampoo for hair. It relieves dandruff, revitalizes the sebaceous glands, prevents hair-loss, stimulates hair growth and gives hair a smooth and silky appearance. It is also the main ingredient in some commercially produced shampoos for black hair like My Hao, Dau Goi Bo Ket FRESH, SunSilk Black Silky in Vietnam or Nature Queen. The thorns of the plant are one of 50 fundamental herbs in traditional Chinese medicine. Also used in Japan, Korea and Vietnam.
Hibiscus tiliaceus	Malvaceae	Indian and/ or Pacific oceans shoreline	Tropical and subtropical coastlines (including South and Southeast Asia)	sea hibiscus (English), waru, baru (Indonesian), sirôn, sirèn (Acehnese), ຕາເສືອ, ຫູເສືອ (Lao), bebaru bulu, baru-baru (Malay), balibago (Filipino/ Tagalog), ปอทะเล/ paw talay (Thai), ai-fau (Tetun), tra làm chiếu (Vietnamese)	Indonesia	leaves	Squeeze 30 leaves in 500 ml water. Remove leaves from the water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	*Waru* leaves contain saponin and have antioxidant and antimicrobial properties. It is also used as a cough medicine and to stimulate hair growth.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Hylocereus undatus	Cactaceae	Central America	Cultivated in tropical Asia and tropical America	dragon fruit, night blooming Cereus (English), buah naga (Indonesian), ຫມາກມັ່ງກອນ (Lao), แก้วมังกร/ kaeo mangkon (Thai), thanh long (Vietnamese)	Vietnam (Choro ethnic group)	stalks, vine, woody vines	Strip the vine off and tear it lengthwise to excrete the surfactant substance. Pound the vine strips and rub them onto the textile. Rinse with clean water. Dry in a well ventilated area.	Studies on the composition of the vine stem are limited and could not be located at the time of writing. A member of the cactus family, it has been reported that the vine stems are “fleshy” and store water to survive drought, so there may be various nutrients and properties contained therein.
Litsea glutinosa 	Lauraceae	South and/ or Southeast Asia	South and Southeast Asia, China, Australia, western Pacific islands, Mauritius and Reunion islands	soft bollygum, bolly beech (English), ຫມີ່, ໝີ່ຕີ໋ (Lao), anonot, balanganan, balongay, batikuling, buknul, butus, dalawen-negro, dungul, ingas, lawat, lormangog, mapipi, marang, olos-olos, panlangutong, porikit, pungo, puso-puso, sablot, sablot-linis, sablut, siblot, tagutugan, tayapok, tilam, tio, tubhus (Philippine languages), ใบหมี่/bai mee, หมี่เหม็น/mee men (Thai), bời lời đỏ (Vietnamese)	Thailand	leaves	Squeeze leaves in water. Remove leaves from the water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	The leaves exude a sticky substance, which is traditionally used in Thailand to make shampoo and cleaners. In Thailand, butterfly pea flowers (*Clitoria ternatea*, Table 5) can be added for “bluing” (laundering process of adding a blue tint to make white clothes look whiter). In the Philippines, it is traditionally used as a binder/grout for buildings.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Oryza sativa 	Poaceae	Possibly southern China, South or Southeast Asia	Wet tropical, semi-tropical, and warm temperate regions	rice straw ash (English), abu merang padi (Indonesian), abu sekam padi (Malay), ขี้เถ้าฟางข้าว/kee thao fang khao (Thai), tro lúa (Vietnamese)	Indonesia, Laos, Malaysia, Vietnam	stalks/hay/ straw	<u>For wet-cleaning and bleaching white cloth</u>: Mix burnt rice straw ash with warm water. Filter out the ash. Soak clothing in the filtered ash water. Rinse with clean water. Dry in a well ventilated area. <u>Vietnam:</u> Burn dry rice straw to obtain ash. Use several banana leaves, shaped into a funnel, to create filter layers. Place the ash into the banana leaves filter-funnel. Pour water slowly through the ash into a receptacle. Soak clothes in the filtered ash water for 30 minutes and rinse with clean water.	Rice straw contains saponin. In Indonesia, rice straw ash is used as a traditional shampoo. It is also traditionally used as a mordant for cotton (when mixed with peanut oil). Washing with ash/lye water is a caustic method. Proceed with caution as the calcium carbonate produced has a bleaching effect.
Sapindus rarak  	Sapindaceae	South and Southeast Asia	South and Southeast Asia, Bhutan, China (Yunnan), Taiwan	soapnut (English), lerak (Indonesian), klerek (Javanese), ຊັກປ່ຳ (Lao), rerak, rerek (Malay), มะซัก/ma sak, มะคำดีควาย/makham dee khwai, ประคำดีควาย/prakham dee khwai (Thai), bồ hòn (Vietnamese)	Indonesia, Thailand, Vietnam	fresh fruit meat, dry seed or dry shell	<u>Indonesia</u>: Boil dry fruits with water. Squeeze them while warm, then add more water. If using fresh fruit, there is no need to boil. <u>Vietnam</u>: Bury fresh soapnut fruits in hot ash to soften the fruit, then crush the fruit into water. Filter out the fruit residue. Wash clothes and rinse with clean water. If using dry fruits, place them into boiling water for a few hours, or slow boil overnight.	This is the most cited plant across the countries included in this research project. The fruit contains saponin, a natural surfactant and is known to have insecticidal and antimicrobial properties. Used widely in Java as a traditional cleaner for batik and precious metal, it is becoming popular as an ‘ecological surfactant’ for home use.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Sarcolobus globosus	Asclepiada-ceae	Tropical Asia	Tropical Asia	หัวลิง/hua ling, ไต้/tai (Thai)	Thailand	leaves	<u>For silk</u>: Use the leaves to produce a detergent.	A kind of saponin or soapnut, it is a relatively soft cleaner. In India, the plant is associated with the 'dhobi', a caste who wash clothes and are connected to the silk city Andhra Pradesh. Traditional practices in these regions use the leaves and rhizomes as medicine.
Securidaca inappendiculata 	Polygalaceae	South and Southeast Asia, southern and southeastern China	South and Southeast Asia, southern and southeastern China	มะเขือแจ้เครือ/ makhuajaekruea (Thai)	Brunei Darussalam, Thailand	outer-skin of fruit	<u>For cotton</u> Use the fruit's outer-skin to produce a detergent. <u>For stain removal:</u> Use ash made from the outer-skin of the fruit to produce a foamy lather.	It is traditionally used as a cleaner in rural Thailand. It can also be used as a shampoo.
Sesbania grandiflora 	Fabaceae	Tropical Asia	Cultivated throughout tropical Asia	hummingbird tree (English), pauk pann phyu (Burmese), turi (Javanese), lamtoro (Indonesian), แค, ຂາວ (Lao), kacang turi, petai belalang, sesban, sesban getih (Malaysian languages), katuray (Filipino/Tagalog), แคบ้าน/khae (Thai), ai-turi (Tetun), so đũa (Vietnamese)	Brunei Darussalam, Indonesia	leaves	Squeeze the leaves into a bucket of water. Sieve the leaves from the water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	*Turi* leaves contain saponin and are reported to possess antibacterial, antifungal and antioxidant properties.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Trigonella foenum-graecum 	Fabaceae	possibly Middle East	South Asia and Mediterranean	fenugreek (English), ပဲနုံသာ/pae na tha (Burmese), kelabat (Indonesian), halba (Malay), ลูกซัด/luuk sat (Thai), feno-grego (Portuguese), cỏ ca ri (Vietnamese)	Thailand	dry seeds	<u>For cotton and silk:</u> Boil dry seeds in water. Sieve through a muslin cloth, squeezing out a concentrate. Mix the concentrate with water. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	The dry seed is a source of saponin, producing a mucilage and oils, which are reported in literature as a finish for cotton to make chintz or shiny cottons. Reported to have antimicrobial, antioxidant, antidiabetic and antitumorigenic properties, it is popularly used in artisanal soap-making in Asia.
Ziziphus mauritiana 	Rhamnaceae	South Asia, eastern Africa and islands in the Indian Ocean	Widely cultivated in Southeast Asia, but also in Africa, Australia, the Pacific and the Americas	Indian jujube (English), bidara (Indonesian/Malay), ໝາກກັ່ນ (Lao), พุทรา/phutsaa (Thai), táo ta (Vietnamese)	Brunei Darussalam	leaves	Crush the leaves until juice is released. Mix with water and soak the textile, or rub gently onto the stain. Rinse with clean water. Dry in a well ventilated area.	The leaves are used as the key ingredient in a commercially available soap in Malaysia called “Clean Best Sabun Daun Bidara”. Plants of the same family are reportedly also used to produce bright green and yellow dyes.
Zollingeria dongnaiensis	Sapindaceae	Thailand and Vietnam	Thailand and Vietnam (Bien Hoa and Con Son) (currently identified as a threatened species on the IUCN Red List)	ขี้หนอน/khee nhon (Thai), giao linh (Vietnamese)	Thailand	raw bark	<u>General cleaning and stain removal for cotton:</u> Cut the raw bark into pieces and boil in water. Remove residue. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	This plant contains saponin in the roots. The seeds are a source for macassar oil. The bark is also used as a traditional dye. It is used in cosmetics, cuisine and cleaning products.

Table 2: GENERAL CLEANING

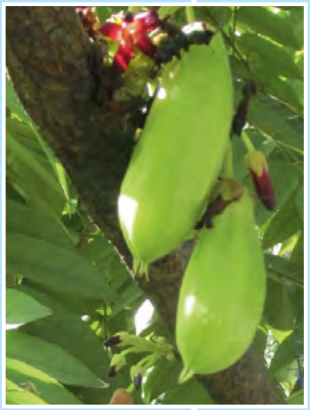
Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Ananas comosus 	Bromeliaceae	South America	Widely cultivated in tropical regions	pineapple (English), nanas, nenas, ananas (Indonesian), ganas (Sundanese), nanas (Malay), pinya / piña (Tagalog), สับปะรด/ saparot (Thai), ainanas (Tetun), dứa (Vietnamese)	Philippines	fruit (juice)	<u>Only for piña cloth:</u> Fruit juice is added to mild soapy water. Soak the textile in the mixture for at least 30 minutes. Rinse with clean water. Dry in a well ventilated area.	Pineapple contains bromelain, a protease (protein enzyme) that acts as a powerful cleaning agent. It has also been proven to enhance the dyeing properties of protein fibres such as wool and silk. Pineapple juice (fermented) is now a key ingredient in a range of non-toxic, chemical-free, all natural household cleaning products, including Pipper Standard and Conscious Living (Thailand). Pineapple bromelain extract features as an ingredient in various patented cleaners, including dishwashing liquid, laundry detergent, contact lens solution and medical equipment cleaner.
Benincasa hispida 	Cucurbitaceae	Origin unclear	Widely cultivated throughout tropical Asia, introduced to other tropical, subtropical and warm temperate climates (especially the Caribbean)	winter melon, ash gourd (English), beligo, blonceng (Indonesian), baligo (Sundanese), kundo (Acehnese), ໝາກໂຕ່ນ (Lao), kundur (Malay), kundol (Tagalog), ฟักเขียว/fak khiaew (Thai), bí đao (Vietnamese)	Indonesia	leaves	Squeeze leaves in water. Remove leaves. Soak the textile. Rinse with clean water. Dry in a well ventilated area.	The fruits, leaves and petioles of the bilimbi contain saponin with antibacterial properties (Indonesia). In Malaysia, very acidic bilimbis are used to clean the blades of kris daggers. In Indonesia, its red flowers are used to make natural red dye for textiles.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Cinnamomum burmannii 	Lauraceae	Southeast Asia	Sri Lanka, Seychelles, Madagascar	cinnamon (English), သစ္ကွမျဲပိုး (Burmese), kayu manis (Indonesian), ສີໄຄຕົ້ນ (Lao), kayu manis (Malay), canela (Tagalog), อบเชย/ obchoey (Thai), quế (Vietnamese)	Thailand	bark, essential oil	<u>For silk and cotton:</u> Use as an ingredient to make herbal water for wet-cleaning.	Cinnamon has been proven to have antimicrobial and antifungal properties, and shows insecticidal activity against mosquito larvae. It is becoming a popularly used ingredient in homemade household care products.
Cocos nucifera	Arecaceae	Unknown (possibly Indo-Pacific region)	Tropical shorelines	coconut (English), ຫມາກພ້າວ (Lao), น้ำมะพร้าว/nam ma prao (Thai), nuu (Tetun), nước dừa (Vietnamese)	Thailand	water	<u>For silk:</u> Soak the cloth in coconut water. Rinse well with clean water. Dry in a well ventilated area.	The sterile coconut water is used as a rinse or cleaner for silk. The coconut water softens and removes the sericin, and starches, which causes the silk to degrade or “eat itself”.
Cymbopogon nardus 	Poaceae	Tropical Asia	Tropical and temperate regions	citronella grass (English), ຫົວສີໄຄ (Lao), serai wangi (Malay), ตะไคร้หอม/ta krai hom (Thai), sả (Vietnamese)	Indonesia, Malaysia	stalks	<u>Soaking Technique:</u> Pound the citronella stalks and mix with warm water. Soak clothes for 30-60 minutes. Rinse with clean water. Dry in well ventilated area. <u>Vapourizing Technique:</u> Mash stalks and mix with hot water. Place textile on a screen or mesh above a hot pot vapourizing the herb. Steam. Dry in well ventilated area.	In Malaysia, citronella grass was formerly used as a detergent, deodorant and insect repellent, and not used during the rainy season or at night. It is used particularly for silks and for cloths with metallic threading (songket). It is believed to repel tiny ants known locally as ‘samut alus’. In Indonesia, it is used in the vapourizing dry-clean method (steamed under a mesh screen with the cloth laid over it) and as an insecticide. The presence of monoterpenes and sesquiterpenes in this plant indicates repelling activity against insects and arthropods.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Luffa acutangula 	Cucurbitaceae	possibly India	Tropical regions	ridged gourd, angled luffa, Chinese okra (English), ဗုဒ္ဒဲ (Burmese), gambas (Indonesian), oyong (Javanese), karawila (Banjarese), ໝາກບອຍ (Lao), patola (Tagalog), บวบเหลี่ยม/bua liam (Thai), mướp khía (Vietnamese)	Laos	Laos	Extract juice from the meat of the fruit. Mix with water to wash clothes. Rinse with clean water. Dry in a well ventilated area.	Studies have identified the presence of saponin in the fruit and seed, but it has not yet been determined whether the content is high enough to be used as a surfactant at the time of writing.
Musa acuminata 	Musaceae	Southeast Asia	Tropical and subtropical regions	banana (English), ໝາກກ້ວຍ (Lao), กล้วย / kluay (Thai)	Laos	pseudo-stem (boiled in water)	Boil the banana stem in water. Allow for the water to cool. Wash clothes in the water. Rinse with clean water. Dry in a well ventilated area.	Banana pseudo-stem showed antioxidant and some antibacterial properties in various studies. While studies have revealed the presence of saponins in this part of the tree, it is unclear whether the saponin content is high enough to act as a surfactant.
Oryza sativa	Poaceae	Possibly southern China, South or Southeast Asia	Wet tropical, semi-tropical, and warm temperate regions	rinsed rice water (English), air cucian beras (Indonesian), air basuhan beras (Malay), น้ำซาวข้าว/ nam sao khao (Thai), nước gạo (Vietnamese)	Thailand	grains (rinsed with water)	<u>For silk (Thailand)</u>: Soak the textile in rinsed rice water. Rinse with clean water. Dry in a well ventilated area. <u>For stain removal (Indonesia)</u>: Soak the textile in rinsed rice water and boil for several minutes to remove the stain.	Asia's best kept secret! Its use in beauty routines is a valuable reason not to let rinsed rice water go to waste. It is used as a skin/face cleanser and for general household cleaning, especially after fermentation, and it is specifically mentioned in the rinsing and washing of fine silks. In Indonesia, it is used as a stain remover. In 2015, fermented rice water made international headlines as the 'beauty secret' of ethnic Yao women in China, whose long hair won them the Guinness Book of World Records mention for "longest hair village".

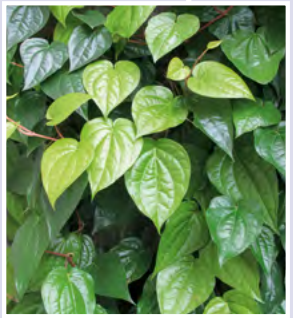
Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Pandanus amaryllifolius 	Pandanaceae	Unknown (first record of flowering specimen: Maluku Islands, Indonesia)	Tropical Asia	fragrant pandan, fragrant screwpine (English), ဆွမ်းမှ□ဒး (Burmese), pandan (Indonesian), ເຕີຍ (Lao), pandan (Malay), pandan (Tagalog), เตยหอม/ teuy hom (Thai), dứa thơm, lá nếp (Vietnamese)	Thailand	leaves	<u>Silk and cotton:</u> Use as an ingredient to make an herbal water for wet-cleaning.	The use of pandan as an ingredient in wet-cleaning herbal water could be a result of its pest mitigation properties, in addition to adding a sweet fragrance.
Pogostemon cablin, Pogostemon hortensis, Pogostemon heyneanus	Lamiaceae	Tropical Asia	P. cablin: South and Southeast Asia, China, Madagascar, Carribean, South America / P. hortensis: Indonesia (Java) / P. heyneanus: South and Southeast Asia	patchouli (English), nilam (Indonesian), dhilem (Javanese/ Maduranese), nilam (Malay), kabling, karlin (Tagalog), katluen (Bisaya), kadlum (Bikol, Sulu), sarok (Igorot), พิมเสน/ pim sen (Thai), quảng hoắc hương (Vietnamese)	Malaysia	leaves	<u>For cotton batik to retain the colour/dyes:</u> Mash the leaves and soak in warm water. Place the batik in the mixture. Soak overnight. Rinse with clean water. Dry in a well ventilated area.	In Malaysia, patchouli is especially used for batik to help preserve the colour. In Indonesia, textiles are soaked in patchouli water as an insect mitigation method.
Stephanotis floribunda	Apocynaceae	Madagascar	Cultivated in some tropical and subtropical regions	Madagascar jasmine (English), ชะลูดช้าง/ chalutchang (Thai)	Thailand	bark, essential oil	Silk and cotton: Use as an ingredient to make herbal water for wet-cleaning.	According to data collected from Thai royal court practices, large silk brocade or painted cotton hip wrappers were commonly washed individually in water scented with sweet Madagascar jasmine.

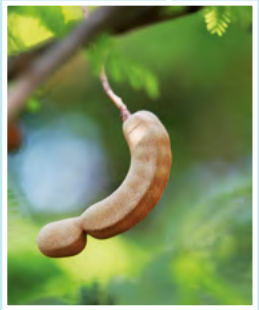
Table 3: STAIN REMOVAL

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Acanthus ilicifolius	Acanthaceae	Australia, Bangladesh, Cambodia, China, India, Indonesia, Macao, Malaysia, Pakistan, Papua New Guinea, Singapore, Sri Lanka, Taiwan, Timor-Leste, Vietnam	mangroves of South and Southeast Asia, southern China, and northern Australia (currently identified as a threatened species on the IUCN Red List)	holy mangrove (English), daruyu (Indonesian), ภ้าม่ามม้ำ (Lao), jeruju puteh (Malay), เหงือกปลาหมอ/ngueak pla mo (Thai), ô rô (Vietnamese)	Vietnam (Nghia Lo, Yen Bai Province)	fruit	Immerse the stain in water. Cut the fruit in half and apply directly onto the stain. Continue with more pieces of fruit until the stain is gone. Rinse with clean water.	In the Philippines, the ash of the plant is recorded as an ingredient to make lye for soap making (published in 1901). Different parts of the plant have been proven to have antifungal and antibacterial properties. This plant is listed as a threatened species as a result of mangrove deforestation.
Averrhoa bilimbi 	Oxalidaceae	Peninsular and archipelagaic Southeast Asia	Cultivated in tropical regions	bilimbi, cucumber tree, tree sorrel (English), belimbing sayur (Indonesian), belimbing wuluh (Javanese), blimpi, calingcing (Sundanese), ໝາກເຟືອງ (Lao), belimbing buluh, belimbing asam (Malay), kamias, kamyas, kalamyas (Tagalog), iba (Aklanon), ตะลิงปลิง/taling pling (Thai), khế tàu (Vietnamese)	Indonesia, Philippines	fruit juice	<u>Indonesia:</u> Apply the juice to the stain and rub gently. Rinse with clean water. Dry in a well ventilated area. <u>For fine piña cloth (Philippines):</u> To maintain the whiteness and remove stains, add fruit juice to mild commercial soapy water. Rinse with clean water. Dry in a well ventilated area.	According to weavers and embroiderers in the Philippines (Aklan Region), piña cloth is usually cleaned by gentle hand-washing in lukewarm water with mild soap; it should neither be scrubbed nor squeezed because of its extreme fragility. To maintain the whiteness of the cloth, bilimbi fruit juice (kamias) is added to the soapy water (pineapple fruit juice is also used as an alternative). The fruit and leaves have effective antibacterial properties, and its high citric acid content may be one of the effective agents in stain removal.
Catunaregam spinosa / Catunaregam tomentosa *(formerly Randia tomentosa)*	Rubiaceae	South Asia	South Asia, Cambodia, northern Malaysia, Myanmar, Thailand, Vietnam	indigoberry (English), หนามแท่ง/nam thang, มะเค็ด/ma khet (Thai), găng trắng (Vietnamese)	Vietnam (Nghia Lo, Yen Bai Province)	fruit	Immerse the stain in water. Cut the fruit in half and apply directly onto the stain. Repeat with more fruit slices until the stain is removed. Rinse with clean water.	The fruit is traditionally used as a shampoo, soap and toothpaste in Thailand. In India, the fruit was traditionally used to wash wool fibre clothes. It has proven antibacterial properties.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Citrofortunella microcarpa	Rutaceae	First cultivated in the Philippines	Cultivated in Southeast Asia, South Asia, Hawaii, Carribean, Central and North America	calamondin (English), limau kasturi (Malay), kalamansi, aldonisis (Tagalog), kalamunding (Pampangan), limonsito/simuyaw (Bisaya)	Philippines	fruit juice	Fruit juice and salt are applied directly onto the stain. Rinse with clean water.	The use of citrus fruits (lime, lemon, calamondin, kumquat) as a stain remover is common 'kitchen wisdom', as the fruit's natural citric acid content helps to remove stains. The essential oils found in the fruit peels are also a rich source of limonene, a naturally occurring solvent that is effective in removing oil stains. Limonene is a terpene, a set of organic compounds that gives citrus fruits their scent, now synthetically reproduced as a fragrance, in home and personal care, cosmetics, food, and as a botanical insect repellent and insecticide.
Citrus japonica 	Rutaceae	Southern China		kumquat (English), kumkuat (Malay), kim kiat (Tagalog), kumkuwat (Cebu Bisaya), ส้มจี๊ด/som jeed (Thai), kim quất (Vietnamese)	Malaysia	fruit	For rust stains and perfuming: Cut two limes. Rub onto the rust stain. Soak in salt water. Rinse with clean water.	
Citrus hystrix 	Rutaceae	Tropical Asia	Tropical Asia	kaffir lime (English), jeruk lemon (Indonesian), ມະກູດ (Lao), limau purut (Malay), มะกรูด/ makrut (Thai), chanh Thái (Vietnamese)	Malaysia	fruit	For rust stains and perfuming: Cut two limes. Rub onto the rust stain. Soak in salt water. Rinse with clean water.	
Citrus × aurantiifolia 	Rutaceae	Hybrid Possibly South and/ or Southeast Asia	Cultivated worldwide in tropical and subtropical regions	lime (English), jeruk nipis (Indonesian), ໝາກນາວ (Lao), limau nipis (Malay), มะนาว/manao (Thai), derok-masin, derok-siin (Tetun), chanh ta (Vietnamese)	Indonesia Malaysia Singapore	fruit	<u>Malaysia, for rust stains and perfuming:</u> Cut two limes. Rub onto the rust stain. Soak in salt water. Rinse with clean water. <u>Singapore:</u> Apply directly onto the stain. It could also be made into a paste either with salt or baking powder.	
Citrus medica 	Rutaceae	Unknown (possibly India, Southeast Asia, or other)	Cultivated in the Mediterranean region	lemon, citron (English), ໝາກນາວ (Lao), asam kerat lintang (Malay), derok-fatuk (Tetun)	Indonesia, Malaysia, Singapore	fruit	For rust stains and perfuming: Cut the fruit into two halves. Rub onto the rust stain. Soak in salt water. Rinse with clean water.	

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Cocos nucifera	Arecaceae	Unknown (possibly Indo-Pacific region)	Tropical shorelines	coconut (English), kelapa (Indonesian, Malay), ຫມາກພ້າວ (Lao), niyog (Filipino), มะพร้าว/ ma prao (Thai), nuu (Tetun), dừa (Vietnamese)	Timor-Leste	meat and husk	Chew a slice of the meat of the coconut. Spit the chewed coconut meat onto the stain and rub gently with a coconut husk. Repeat until the stain is removed.	This practice was recorded through one informant in Timor-Leste's Lautem District who claimed it to be very effective.
Limonia acidissima / Hesperethusa crenulata / Feronia limonia 	Rutaceae	Myanmar, India, Sri Lanka, Java, Pakistan.	Common throughout Southeast Asia	thanaka tree, wood apple (English), သနပ်ခါး/thanaka (Myanmar) ខ្នុរ (Khmer), kawista, kusta (Indonesian), gelinggai, belinggai (Malay) มะขวิด makhwit (Central Thai), มะฟิด/mafit (Northern Thai), cây quách (Vietnamese)	Myanmar	wood	Grind thanaka wood on a stone slab and add a few drops of water to make a paste. Apply the thanaka paste onto the stain. Leave to dry. Rinse with clean water.	Thanaka bark might act as a poultice. The different varieties of the thanaka tree in Myanmar vary in quality, but those grown in Shwebo, Shihm Taung and Pakokku districts are considered the best. It is also used as an insect repellent and is becoming very popular in Asian cosmetics as a natural whitener. In India, it is a religious tree planted in temples and gardens, known for its medicinal properties, and appears in Valmiki's Ramayana.
Morinda citrifolia 	Rubiaceae	Unknown (Southeast Asia, Australia or Polynesia)	Southern Pacific region, India, the Caribbean, South America and the West Indies	Indian mulberry, cheese fruit (English), noni (Hawaiian), pacé (Javanese) ໝາກຍໍ (Lao), mengkudu (Indonesia, Malay), kemudu (Acehnese), bankoro, tumbong-aso (Tagalog), bangkuro (Bisaya), apatot-nga-basit, apatot (Ilokano), ยอ บ้าน/yawbaan (Thai), ai-nenuk (Tetun), nenuka (Fataluku), nhàu (Vietnamese)	Indonesia	juice from fruit	<u>Stain removal:</u> Apply the juice of a ripe fruit to the cloth and rub gently. <u>Bleaching agent:</u> Extract the juice of 2 ripe fruits, add 1 litre of water. Soak the cloth in the liquid for one hour. Rinse well with clean water.	Traditionally, noni fruits have been used in Southeast Asia for the healing and prevention of various diseases such as cancer, arthritis, and hypertension. The popularity of this fruit has resulted in the development of various health food products, including noni juice, vinegar, powder and tablets. The root bark is said to produce a stable red dye for textiles, with historical evidence of its use as a dye in Java and Bali dating back to the 9th century. It is still in use in Timor-Leste. The fruit juice is alkaline, which may explain its effectiveness as a stain remover.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Oryza sativa 	Poaceae	Possibly southern China, South or Southeast Asia	Wet tropical, semi-tropical, and warm temperate regions	rice (English), nasi (Indonesian, Malay), ເຂົ້າ (Lao), ข้าว/ khao (Thai), cơm (Vietnamese)	Singapore, Vietnam	grains (cooked) rice wine residue	<u>For Chinese painting ink (Singapore):</u> Cook the rice and rub cooked grains onto the ink stain before washing. <u>Vietnam:</u> Soak the clothes overnight in rice wine residue mixed with water. Rinse with a clean water and dry in a well ventilated area.	The use of rice wine residue as a stain remover may be a result of the alcohol produced from fermentation, which kills bacteria, just as white wine is used as a 'kitchen wisdom' stain remover in Western countries.
Piper betle 	Piperaceae	South and Southeast Asia	Cultivated in South and Southeast Asia	betel (English), ຜູ (Lao), sireh (Malay), พลู/phlu (Thai), malus, furuk (Tetun), maluhu (Fataluku), trầu không (Vietnamese)	Vietnam (Tai ethnic group, Thanh Hoa Province)	leaves	<u>Stain removal (1):</u> Crush a handful of betel leaves in water and remove the residue. Soak the textile in the betel leaf infused. Rinse with clean water. <u>Stain removal (2):</u> Boil a handful of betel leaves for 10-20 minutes, remove the residue. Allow the water to cool down and soak the clothes for about 30 minutes, scrubbing the stain until it is removed. Rinse with clean water.	In addition to acting as a stain remover, the use of betel leaves is said to clean perspiration (sweat) and to increase the durability and fastness of the dye colour. Betel leaves are traditionally consumed in Southeast Asia with the areca nut as part of a ritual, or for everyday consumption as a stimulant.
Solanum lycopersicum 	Solanaceae	South America	Worldwide	tomato (English), ໝາກເລັ່ນ (Lao), มะเขือเทศ/makhuathet (Thai), cà chua (Vietnamese)	Myanmar	fruit	For rust stains: Slice the fruit and apply onto the stain. Let it dry it under the sun. Rinse with clean water.	As the tomato ripens, Vitamin C decreases and oxalic acid increases. Oxalic acid is industrially known as a rust remover, found in baking powder and other indusrial cleaning agents.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Tamarindus indica 	Fabaceae	Savanna tropical Africa	Cultivated in Asia, Africa, Central and South America	tamarind (English), ໝາກຂາມ (Lao), มะขาม/makham (Thai), ai-sukaer (Tetun), kailemu (Fataluku), me (Vietnamese)	Thailand	juice	For betel stains on cotton: Smear tamarind juice onto the betel stain. Rub gently. Rinse with clean water.	Known for its antimicrobial properties, tamarind is a common ingredient in Southeast Asian traditional soaps, alongside turmeric. In fact the two are often mixed together in Thai traditional soaps. In India, the kernels produce a gel and are made into a powder that is used as a starch/gum in the textile industry for textile thickening and sizing, for sizing in the dyeing industry, jute sizing, cotton wraps and cosmetics.

Other Stain Removal Methods (not plant-based)	Scientific Name	Common Name	Purpose	Recorded Country of Practice	Material(s)	Preparation Method	Comments
	Phylloda foliacea (marine bivalve organism)	ash from burnt clam shells (English), หอยกาบ/hoikaab (Thai)	oily stain removal for silk	Thailand	shell of the *Phylloda foliacea* (marine bivalve organism)	<u>Stain removal for silk:</u> Burn the shells to obtain ash. Use the ash to make a lime (calcium carbonate) paste. Use the lime paste as a stain remover.	This method can also be used to clean oily surfaces. Like 'washing soda', sodium carbonate, or soda ash, which is a water softener, the alkali removes stubborn stains.
	Calcium carbonate (from limestone)	lime paste (English), kapur makan, kapur sireh (Malay)	banana resin stain removal	Malaysia	paste made from limestone	Apply a small amount of lime paste (calcium carbonate, kapur makan, kapur sireh) onto the banana resin stain. Leave for a few minutes and rinse.	This method was tested at the National Textile Museum (Malaysia) where this technique was applied to a songket stained with curry. The reporting researcher noted that the solution was very strong and bleached the fabric.
	Fluoride + Sodium lauryl sulfate	toothpaste	general stain removal	Philippines	commercial toothpaste	Apply directly to the stain with a cloth, finger or brush, and rinse off.	Toothpaste is a mild abrasive, and contains calcium carbonate (same as ash/lye water and lime paste) and sodium lauryl sulfate, an industrially produced surfactant that is harmful to the environment and is harsh for the skin, hair and fabric.

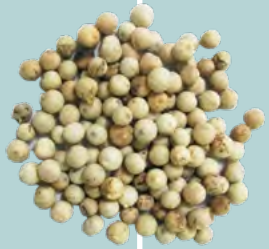
Table 4: PEST MITIGATION

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Annona muricata 	Annonaceae	Caribbean, Central America	Tropical and subtropical regions	soursop (English), nangka sebrang, nangka landa, nangka belanda (Javanese), nangka walanda, sirsak (Sundanese), nangka buris, nangkelan (Maduranese), srikaya jawa (Balinese), boh lôna (Acehnese), ຫັ ບ ທ ะ ล ิ ด (Lao), durian belanda, durian benggala (Malay), lampun (Dusun), guyabano (Tagalog), atti (Ibanag), babana (Panay Bisaya), bayubana (Iloko), labanos (Bikol), ทุเรียนเทศ/thurian thet (Thai), ai-ata-boot (Tetun), koitchila laka lakarana (Fataluku), mãng cầu Xiêm (Vietnamese)	Indonesia	leaves (fresh)	Place fresh leaves near the textile in the storage area/ container.	In addition to the soursop's international reputation as a cancer fighting "superfood", the leaves have been proven to be effective as an insecticide and larvicide, making it an eco-friendly alternative to industrial pesticides and repellents. Scientific literature reveals that soursop leaves contain beta-caryophyllene, which has proven insect repelling properties.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Capsicum frutescens 	Solanaceae	South/ Central America	Widely cultivated and tropical and subtropical regions	chilli pepper (English), ငရုတ်သီး (Burmese), ຫມາກເຜັດ (Lao), พริก/prik (Thai), ai-manas, kunus (Tetun), kurisa (Fataluku), ớt (Vietnamese)	Thailand	Dry fruit and the oil from pepper	Place a bag of dry chilli peppers in the storage container (especially for silk).	Chilli is a traditional repellent against insects and pests, and its active ingredient capsicum is replicated in commercial synthetic insect repellents.
Cinnamomum camphora	Lauraceae	Subtropical East Asia, northern Vietnam	Naturalized in other warm climates worldwide (Australia, southern USA, southern Europe, southern and eastern Africa)	camphor (English), ပရုတ်ချ (Burmese), การบูร/karabun (Thai), ai-kanfor (Tetun), long não (Vietnamese)	Laos, Thailand, Timor-Leste	roots, wood, distilled wax	Place camphor near the textile in the storage area/container (especially for silk).	Camphor wood repels insects and corrosive salts and water. The wood has been used for centuries to makes chests, which were referred to sometimes as 'sailor chests'. The wood is antimicrobial and insect repelling. It is especially known to repel moths in China. Camphor is a source of linalool, an antimicrobial and insecticidal essential oil that occurs naturally in some plants.
Cinnamomum burmannii 	Lauraceae	Southeast Asia	Southeast Asia and other wet tropical climates (Australia, Mauritius, Hawaii)	cinnamon (English), သစ္ကွမျိုး (Burmese), kayu manis (Indonesian, Malay), ສີໄຄຕົ້ນ (Lao), kanela, canela (Tagalog), อบเชย/obchoey (Thai), quế (Vietnamese)	Malaysia	bark	Place bark near the textile in the storage area/container.	It is said to be an effective repellent against silverfish and ants (Malaysia). Scientific literature reveals that cinnamon contains beta-caryophyllene and linalool, two turpenes (organic sets of compounds emitting a strong smell) which have proven repellent activity against mosquitoes and beetles.
Harrisonia perforata	Simarouba-ceae	Southeast Asia	Southeast Asia	ri kengkeng (Javanese) ກັບທາ, ໂກນທາ (Lao), kait-kait (Malay) mamikil, asimau (Tagalog), muntani (Bisaya), สีฟันคนทา/ seephan khontha,จี้/ chee (Thai), đa đa (Vietnamese)	Thailand	Leaves, stem	Place leaf near the textile in the storage area/container.	This plant is a source of various limonoids (a class of terpenes, which are organic compounds that emit a strong smell and produce essential oil), which act as an insect and possibly even rat repellent.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Manihot esculenta	Euphorbiaceae	South America	Cultivated in tropical and subtropical regions	cassava (English), ဆေးရွက်ကျဲ (Burmese), singkong / ubi kayu (Indonesian), bột năng (Vietnamese)	Indonesia	root in dry powder form (flour)	Mix the cassava flour with hot water. Add more water. Soak the textiles in the mixture. Rub evenly and dry.	Fresh cassava roots, if not treated, contain cyanide, which is toxic when consumed and commonly used as an insecticide and pesticide. Dry cassava flour still contains some cyanide, which would help to explain its potential use as an insect mitigation method.
Nicotiana tabacum 	Solanaceae	Tropical and subtropical America	Cultivated worldwide	tobacco (English), tembakau (Indonesian, Malay), ຢາສູບ (Lao), tabako (Tagalog), ยาสูบ/ yasoop (Thai), tabaku (Tetun), chi thuốc lá (Vietnamese)	Laos, Thailand, Timor-Leste	leaves	Place leaf near the textile in the storage area/container.	Tobacco water has long been used across the world as a natural insecticide to protect gardens and crops from pests. It is a popular ingredient for homemade insecticide.
Ocimum basilicum var. thyrsiflora 	Lamiaceae	Southeast Asia	Southeast Asia	Thai basil (English), kemangi (Indonesian), ບົວລະພາ (Lao), daun kemangi (Malay), กะเพรา/kaprao (Thai), húng quế (Vietnamese)	Singapore	leaves	Scatter leaves in the storage container.	The presence of linalool and limonene (terpenes, organic compounds that emit a strong smell, which can be made into essential oils) in the basil species make this common herb an effective natural repellent against insects and arthropods. Basil also contains apigenin and quercetin, which are flavonoids capable of repelling and even killing insects, especially the rice weevil, a common stored product pest.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Pandanus amaryllifolius 	Pandanaceae	Unknown (first record of flowering specimen: Maluku Islands, Indonesia)	Widely cultivated in tropical Asia	fragrant pandan, fragrant screwpine (English), ဆွမ်းမှ□ဒး (Burmese), ស្លឹកគ្រឹយ (Khmer), pandan (Indonesian, Malay, Tagalog), ເຕີຍ (Lao), เตยหอม/ teuy hom (Thai), dứa thơm, lá nếp (Vietnamese)	Indonesia Malaysia Philippines Singapore	leaves (Malaysia, Singapore) flower (Indonesia)	Tie the pandan leaves into bundles. Place them around the textile and monitor for about one month. Replace when fragrance has dissipated. (Once the leaves are dry and the scent has dissipated, they can become a food source.)	The use of pandan is a widely known traditional method to repel cockroaches in Malaysia and Singapore. This insect mitigation method has been applied and proved effective at the National Textile Museum Malaysia in Kuala Lumpur (implemented by curator Syahrul Mohd bin Ab Ghani). Pandan is a source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.).
Pandanus tectorius	Pandanaceae	Southeast Asia (coastal lowlands), Pacific islands, eastern Australia	Southeast Asia (coastal lowlands), Pacific islands, eastern Australia	Tahitian screwpine, hala tree (English), kembang pudhak (Indonesian)	Indonesia (Java)	fresh male flower	Place a fresh (male) flower in the storage near the textile.	This plant contains apigenin and quercetin, which are flavonoids capable of repelling and even killing insects, especially the rice weevil, a common stored product pest.
Piper betle 	Piperaceae	South and Southeast Asia	Cultivated in South and Southeast Asia	betel (English), ໝູ (Lao), sireh (Malay), พลู/phlu (Thai), trầu không (Vietnamese)	Indonesia	leaves	Place fresh sliced leaves in the cupboard or near the cupboard (outside).	Betel is a source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.).

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Piper nigrum 	Piperaceae	South India	Extensively cultivated in tropical regions.	peppercorn (English), ငရုတ်ကောင်းဆုံး (Burmese), lada / merica (Indonesian), mrico (Javanese), ພິກນ້ອຍ (Lao), lada (Malay), paminta (Tagalog), พริกไทย/ prik thai (Thai), hồ tiêu (Vietnamese)	Indonesia, Singapore, Thailand	dried fruit	Place dry pepper in small cotton sac, and place in the storage area. Replace once the scent has dissipated.	Scientific literature reveals that peppercorns contains beta-caryophyllene, which has proven insect repelling properties. Pepper is a also source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.).
Pogostemon cablin, Pogostemon hortensis, Pogostemon heyneanus	Lamiaceae	Tropical Asia	*P. cablin*: South and Southeast Asia, China, Madagascar, Carribean, South America *P. hortensis:* Indonesia (Java) *P. heyneanus*: South and Southeast Asia	patchouli (English), nilam (Indonesian, Malay), dhilem (Javanese/ Maduranese), kabling, karlin (Tagalog), katluen (Bisaya), kadlum (Bikol, Samar-Leyte Bisaya, Sulu), sarok (Igorot), พิมเสน/ pimsen (Thai), quảng hoắc hương (Vietnamese)	Indonesia	leaves	Insect mitigation and perfuming: Squeeze 10- 20 leaves in a bucket of water. Soak textiles (after washing) in this mixture.	Patchouli oil is a rich source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.).
Santalum album	Santalaceae	Indonesia, Malay Archipelago, India	Java (Indonesia), Malaysia, Myanmar, Thailand, Vietnam, India, China, Sri Lanka, Nepal, Taiwan	sandalwood (English), cendana (Indonesian, Malay), ไม้จันทน์/mai jandan (Thai), gỗ đàn hương (Vietnamese)	Malaysia	wood	Build a storage container (box, chest, cabinet) with the wood to repel insects.	Sandalwood is a rich source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.).
Syzygium aromaticum 	Myrtaceae	Maluku Islands (Indonesia)	Maluku Islands (Indonesia)	clove (English), cengkeh (Indonesian), จัม, ดอก (Lao), cengkih (Malay), การพลู/kan phlu (Thai), đinh hương (Vietnamese)	Indonesia Malaysia	dry fruit	Place the dry cloves in small cotton sac, and place the sac near the clothes, avoiding direct contact. Monitor and change after two months.	Scientific literature reveals that clove contains beta-caryophyllene, which has proven insect repelling properties.

Latin	Family	Native to	Geographic Distribution	Plant Name(s)	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method	Comments
Vetiveria zizanioides / Chrysopogon zizanioides 	Poaceae	Marshy areas of India, Bangladesh and Myanmar	Naturalized across Southeast Asia, China, Brazil, Caribbean	Naturalized across Southeast Asia, China, Brazil, Caribbean	Indonesia Philippines	dry root	Place a handful of dry root in the storage area.	Vetiver essential oil made from the roots of the plant has proven efficacy as a termite repellent, as the oil is a rich source of sesquiterpene, a type of terpene (organic compounds that emit a strong smell and produce essential oil) that has been proven to repel and be toxic to Southeast Asian termites (Neotermes spp.). Vetiver root oil is widely used in soaps, perfumes and cosmetics, and has proven antimicrobial properties.

Other Pest Mitigation Methods (not plant-based)	Scientific Name	Common Name	Purpose	Recorded Country of Practice	Material(s)	Preparation Method	Comments
	Acetic acid	vinegar	insect mitigation for cotton	Thailand	vinegar and bowl	Place a bowl of vinegar in the cockroaches' pathway	sesquiterpenoids
	Kerosene	paraffin, lamp oil, coal oil	pest mitigation + yarn treatment to smoothen the threats prior to weaving	Malaysia	commercially available kerosene	Set up the yarn in the loom. Apply kerosene to the threads. Start weaving.	Kerosene can also be used as a fumigant (newspaper is soaked in kerosene and then heated to give off gas).
	Naphthalene, aromatic hydrocarbon	mothball	insect mitigation	Brunei Darussalam, Malaysia Myanmar, Philippines, Thailand	bag of mothballs	Place a bag of naphthalene in the cupboard near the textile.	Mothballs are now made from dichlorobenzene and have been reformulated since its inception. In the West, it is not as extensively used as it was in the 1940s-1990s. In Asia it is still widely available and used, especially in Myanmar.
	Pavo muticus feather	peacock feather	insect mitigation for batik cloth	Indonesia	feather	Place a clean peacock feather inside the cupboard.	The peacock feather's bright colours are produced by microscopic crystal-like structures. Slight alterations in the spacing of these structure cause different wavelengths of light to be filtered and reflected, creating many different iridescent hues, a visual effect that might frighten insects and keep them away.

Table 5: MISCELLANEOUS TEXTILE TREATMENTS

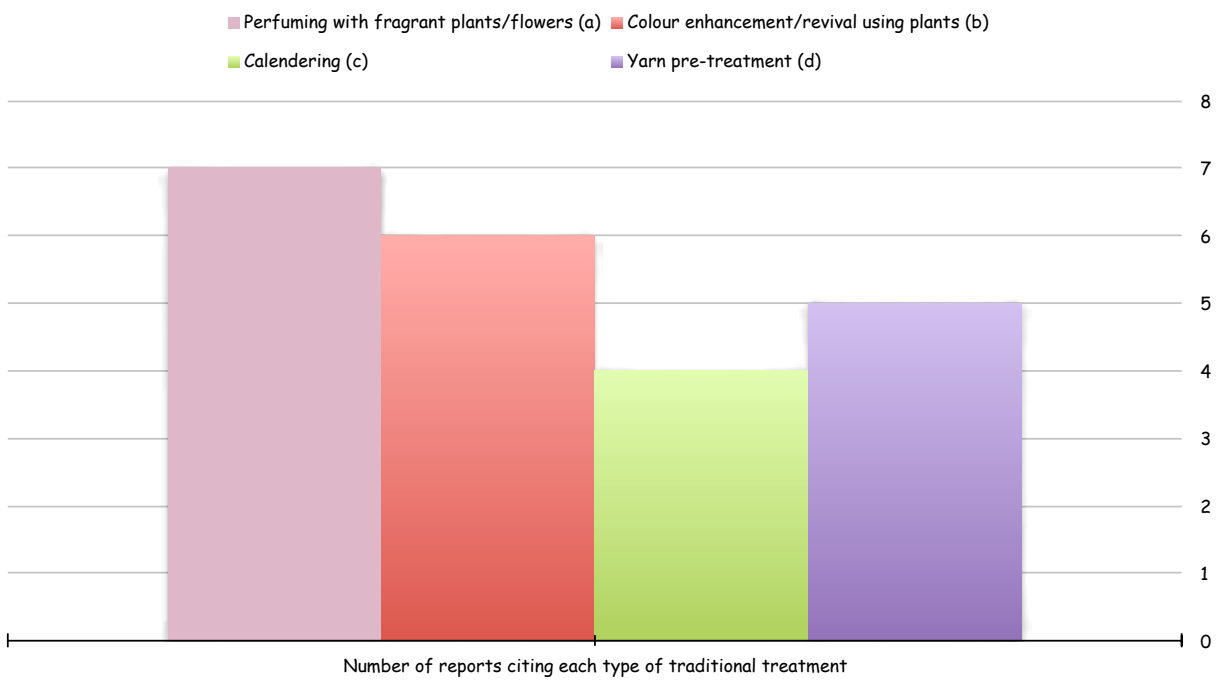
Scientific name	Family	Native to	Geographic Distribution	Plant Name(s)	Purpose	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method
Aleurites moluccana 	*Euphorbiaceae*	Southeast Asia and Pacific Islands	Southeast Asia and Pacific Islands; introduced to Brazil, the Caribbean, Japan, Kenya, South Asia, Uganda and the USA	candlenut (English), kamere, kemiri (Javanese), byo-u (T'boli), โพธิสัตย์/ photisat, มะเยา/mayao (Thai), ai-kami (Tetun), hai (Fataluku), lai, dầu lai, trẩu xoan (Vietnamese), kukui (Hawaiian)	***Abacá* cloth teatment for pliability and shine**	Philippines	nut	Abacá fibres are washed with ground nuts mixed in water to make the fibres soft and shiny.
Camellia sinensis 	*Theaceae*	East, South and Southeast Asia	Cultivated in tropical and subtropical regions	tea (English), teh (Indonesian), ໝ້ຽໆຊາ (Lao), ชา/chaa (Thai), trà (Vietnamese)	**Treatment to preserve/revive batik colour**	Indonesia Malaysia Singapore	leaves	Boil dry tea leaves with water and sieve. Soak the batik clothes in the tea water for 20 minutes. Rinse with clean water and dry in a well ventilated area.
Carica papaya 	*Caricaceae*	Mexico, Central America	Cultivated in tropical and warm subtropical regions	papaya (English), pepaya (Indonesian), katès (Javanese), gedang (Sundanese), ໝາກຫຸ່ງ (Lao), betik (Malay), papaya (Philippines), มะละกอ/malakor (Thai), aidila (Tetun), đu đủ (Vietnamese)	**Treatment to preserve/revive batik colour**	Malaysia Singapore	leaf	Mash papaya leaf in water. Soak batik cloth in the solution overnight. Rinse.
Clitoria ternatea 	*Fabaceae*	Origin uncertain	Tropical equatorial Asia. Introduced to Africa, Australia and the Americas.	butterfly pea (English), kembang telang (Indonesian), kembang teleng (Javanese), pokok telang (Malay), pukingan (Tagalog), balog-balog (Cebu Bisaya), giting-princesa (Bikol), kalompagi, samsamping (Iloko), samsampin (Pangasinan), อัญชัน (Thai), đậu biếc (Vietnamese)	**"Bluing" method (to make white clothes whiter by adding a blue tint)**	Thailand	flower	Add flowers to the boiling solution in natural detergent preparation.

Scientific name	Family	Native to	Geographic Distribution	Plant Name(s)	Purpose	Recorded Country of Practice	Part(s) of the Plant Used	Preparation Method
Indigofera spp. 	*Fabaceae*	Unknown. Possibly India	Tropical regions worldwide	indigo, nila (Indonesian, Malay), tarum (Indonesian)	**"Bluing" method (to make white clothes whiter by adding a blue tint)**	Singapore Thailand	blue dye powder obtained from the leaves, previously available as a laundry powder	Add the blue indigo laundry powder to the water during the washing process.
Morinda citrifolia 	*Rubiaceae*	Unknown (Southeast Asia, Australia or Polynesia)	Southern Pacific region, India, the Caribbean, South America and the West Indies	Indian mulberry, cheese fruit (English), noni (Hawaiian), pacé (Javanese) ໝາກຍໍ (Lao), mengkudu (Indonesia, Malay), bankoro, tumbong-aso (Tagalog), bangkuro (Bisaya), apatot-nga-basit, apatot (Ilokano), ยอบ้าน/ yawbaan (Thai), ai-nenuk (Tetun), nenuka (Fataluku), nhàu (Vietnamese)	**Yarn pre-treatment applied before the dyeing process during the "Pusimina" ritual**	Ende, Flores, Indonesia	root	Boil root and other herbs in ash water made from coconut palm fronds (see *Cocos nucifera*, Table 1 for preparation method). Apply to ikat yarn.
"Ratus" *(secret recipe including Cinnamomum burmannii + Santalum album + Syzygium aromaticum + Trigonella foenum-graecum + Vetiveria zizanioides + unknown)*	*Lauraceae, Santalaceae, Myrtaceae, Fabaceae, Poaceae* 	Various origins, mainly South and Southeast Asia	Mainly South and Southeast Asia and Southern China	ratus (Indonesian, Malay): cinnamon, sandalwood, clove, fenugreek, vetiver and others (see Table 4 Pest Mitigation for these plant names in other languages)	**Dry-cleaning, perfuming and insect mitigation** **"*Meratus*"** (to smoke an item using "ratus" traditional Indonesian incense, a secret recipe transmitted from generation to generation)	Indonesia Malaysia	combination of dry bark, leaves, seeds and roots	Method 1 (Malaysia and Indonesia) dry-cleaning or vapourizing method (antifungal, antibacterial and insecticide fumigation): Place ratus in an incense burner. Place a large basket or chicken trap as a mesh structure over the smoking ratus and spread the textile over the mesh, allowing the smoke to fumigate the textile for some time. Method 2 (Malaysia): Use ratus as stuffing for a small cloth pouch. Place in the storage area next the textile to repel insects and perfume the fabric.

Plants for fragrance treatment	PERFUMING						
Scientific name	**Family**	**Native to**	**Geographic Distribution**	**Plant Name(s)**	**Recorded Country of Practice**	**Part(s) of the Plant Used**	**Preparation Method**
Cananga odorata	*Annonaceae*	Indonesia, Malaysia, Philippines	Indonesia, Malaysia, Philippines, Madagascar, Polynesia	ylang-ylang (English), bunga kenanga (Indonesian), ilang-ilang (Tagalog), bunga kenanga (Malay)	Malaysia Thailand	flower (Malaysia) flower / essential oil (Thailand)	Malaysia: Place flowers in between the fabrics or clothes, ensuring that there is a lining in between to prevent any stains. Monitor, change, and repeat. Thailand: Use as an ingredient to make scented candles and smoke the textile.
Jasminum sambac	*Oleaceae*	Bhutan, India, Pakistan	South and Southeast Asia, Madagascar, the Caribbean	Arabian jasmine (English), bunga melur (Malay), มะลิลา/malila (Thai)	Malaysia Thailand	flower (Malaysia) flower / essential oil (Thailand)	Malaysia: Place flowers in between the fabrics or clothes, ensuring that there is a lining in between to prevent any stains. Monitor, change, and repeat. Thailand: Use as an ingredient to make scented candles and smoke the textile.
Mammea siamensis	*Calophyllaceae / Guttiferae*	Myanmar, Thailand, Laos, Cambodia, Vietnam	Myanmar, Thailand, Laos, Cambodia, Vietnam	สารภี/saraphi (Thai)	Thailand	flower / essential oil	Use as an ingredient to make scented candles and smoke the textile.
Michelia champaca	*Magnoliaceae*	South and Southeast Asia, southern China	South and Southeast Asia, southern China	champak, yellow jade orchid tree (English), จำปา/jampa (Thai)	Thailand	flower / essential oil	Use as an ingredient to make scented candles and smoke the textile.
Mimusops elengi	*Sapotaceae*	Myanmar, India, Sri Lanka	South and Southeast Asia, northern Australia	bullet wood (English), พิกุล/pikul (Thai)	Thailand	flower / essential oil	Use as an ingredient to make scented candles and smoke the textile.
Rosa x damascena	*Rosaceae*	hybrid species	Bulgaria, Turkey, Middle East, northern Africa (Maghreb)	Damask rose (English), bunga mawar/ros (Malay)	Malaysia	flower	Place flowers in between the fabrics or clothes, ensuring that there is a lining in between to prevent any stains. Monitor, change, and repeat.
Vallaris glabra	*Apocynaceae*	Indonesia (Java)	Indonesia, Malaysia, Thailand	bread flower vine (English), kesidang, kerak nasi (Malay), ชมนาด/chomanaat (Thai)	Thailand	flower / essential oil	Use as an ingredient to make scented candles and smoke the textile.

	Scientific Name	Common Name	Purpose	Country of Recorded Practice	Preparation Method	Comments
Other Methods (synthetic and plant+synthetic mix)	**acetic acid**	vinegar	**Treatment to prevent the dye from bleeding**	Singapore	Add a little bit of vinegar to a pail of water to soak the clothes.	Vinegar is widely used as a natural dye fixative for cotton and linen.
	cornstarch + water	In the Philippines, the mixture is known as “almirol”, made from “gawgaw” and water.	**Stain prevention treatment for abel textiles**	Philippines	For cotton *abel* textiles: Wash the textile and apply the mixture to the water when rinsing.	The *almirol* stiffens the fabric and acts as a fine protective layer so the dirt will not penetrate the textile, making any stains easier to remove when washing.
	Solanum tuberosum + sodium chloride + acetic acid	potato + salt + vinegar	**Dye preservation**	Singapore	Boil and mash two potatoes, add a little salt and vinegar. Mix this paste in water to make a solution. Soak the clothes in the solution for 30 minutes. Wash the clothes as usual.	The starch from the potatoes may contribute to stiffening the fabric.

Chart 11: Additional Traditional Textile Treatments



(a) Indonesia (Java), Indonesia (Bali), Malaysia, Myanmar, Philippines, Thailand

(b) Indonesia (Java), Malaysia, Myanmar, Singapore, Thailand, Vietnam

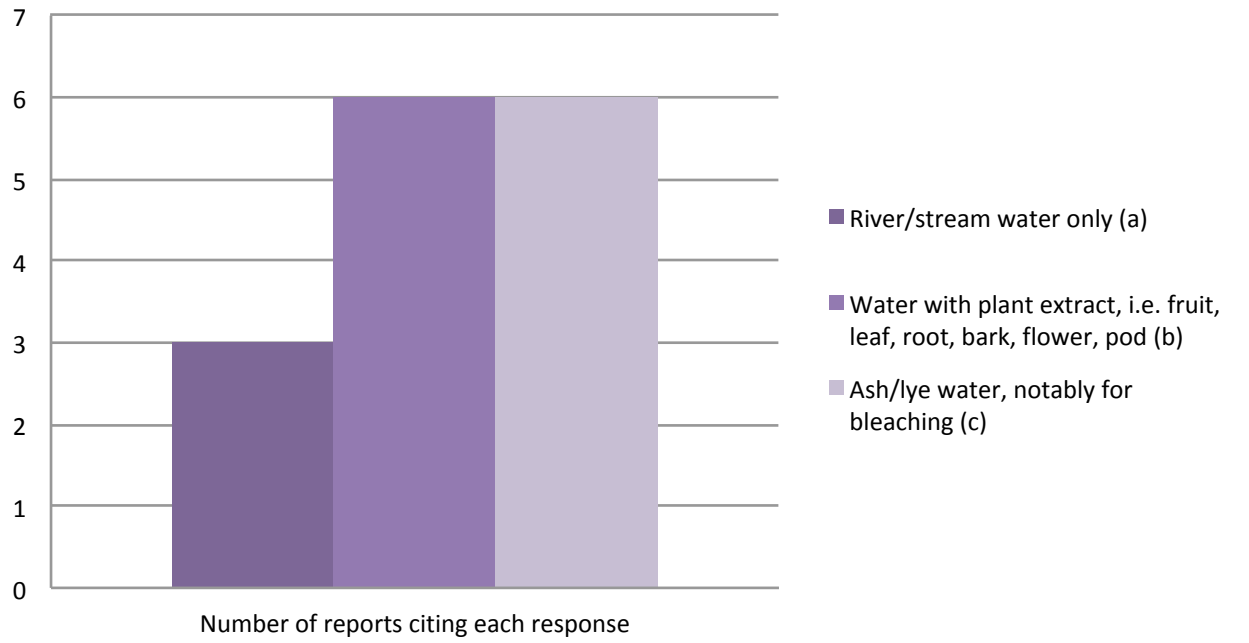
(c) Malaysia, Philippines, Thailand, Vietnam

(d) Laos, Malaysia, Philippines, Thailand

II.a. Smoking/vapourizing (and sometimes perfuming) as a pest mitigation method

Practised in	Status of practice	Method
Brunei Darussalam	Recalled	Textiles were placed in the kitchen near the stove or fire.
Indonesia (Java) Indonesia (Bali)	Still in use	Textile is placed over a chicken cage made from rattan or other woven fibre and smoked with ratus incense.
Malaysia	Recalled	Textile is placed over a chicken cage (serkap ayam) made of woven fibre and smoked with setanggi incense.
Singapore	Recalled	Textiles were laid over a furniture or chair in the morning and smoked with *setanggi* (incense).
Vietnam	Recalled	Textiles were hung by the fire to dry and smoke them.

Types of Traditional Wet-Cleaning Methods (if practised)

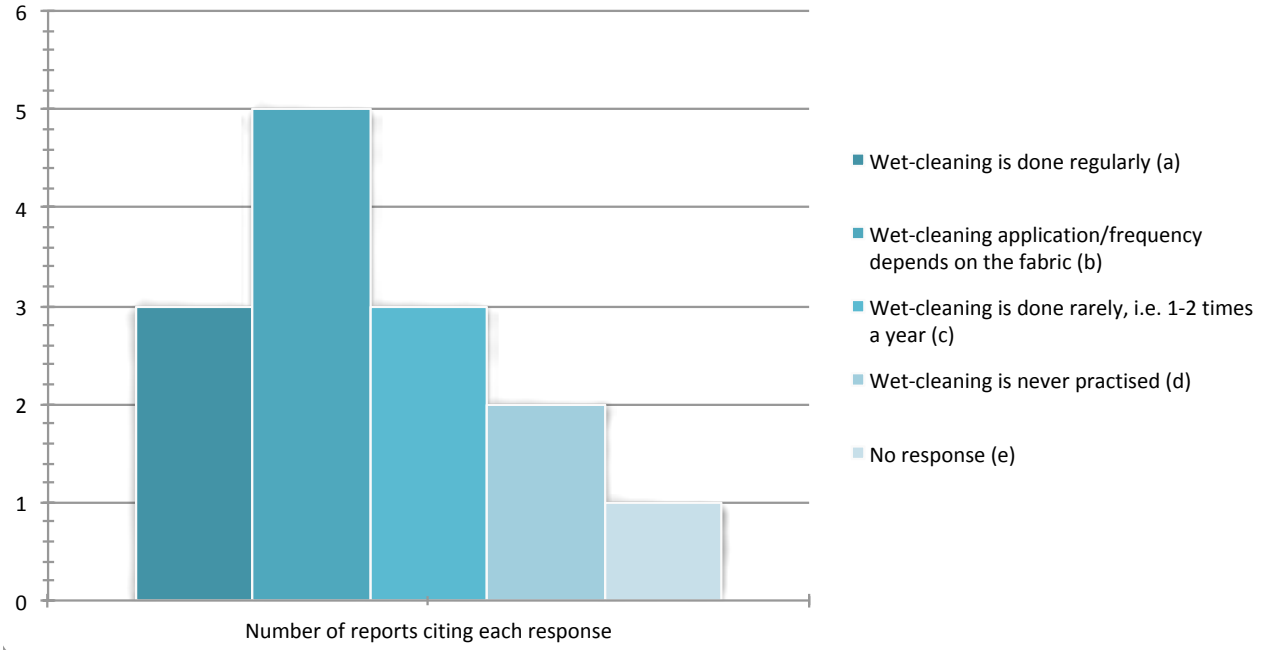


(a) Laos, Philippines, Thailand, Vietnam

(b) Brunei Darussalam, Indonesia (Bali), Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

(c) Indonesia (Java), Indonesia (Bali), Laos, Malaysia, Thailand, Vietnam

Chart 8: Application and Frequency of Wet-cleaning for Traditional Textiles



(a) Myanmar, Philippines, Vietnam

(b) Brunei Darussalam, Indonesia (Java), Malaysia, Laos, Thailand

(c) Brunei Darussalam, Indonesia (Java), Thailand

(d) Indonesia (Bali), Timor-Leste

(e) Singapore

Reported Use of Soapnut (Sapindus rarak) in Wet-Cleaning

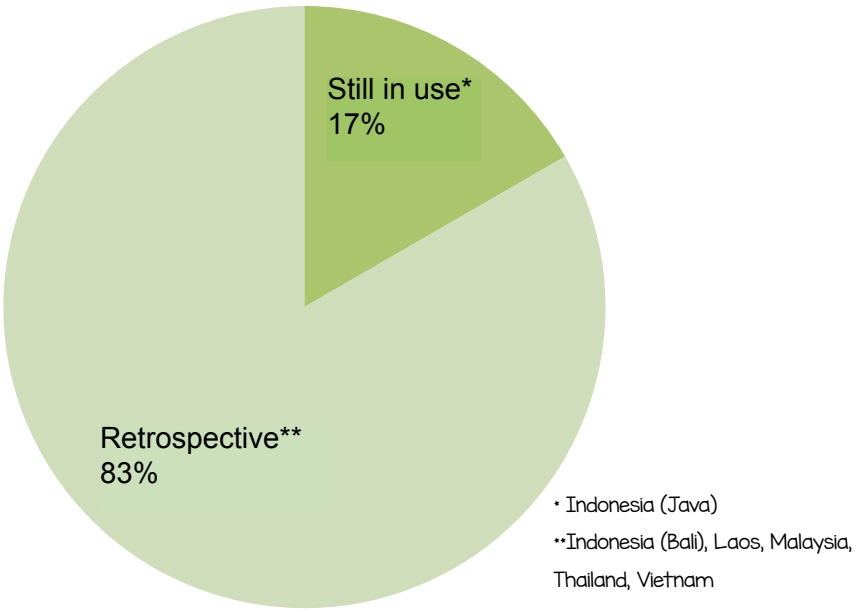
More than half

(54.5%) of the research reports cite the

use of soapnut

(past and current).

Chart 9: Usage Status of Soapnut in Wet-cleaning



Drying after Wet-cleaning

9 out of 11

research reports recorded the drying of traditional textiles in soft, indirect, reflected sunlight (i.e. shaded area, morning sun),

with the exception of 2 reports (Brunei Darussalam and Timor-Leste) citing that textiles are dried in direct sunlight for 30-60 minutes.

LILIAN GARCÍA ALONSO-ALBA

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THE SCIENCE OF CLEANING TEXTILES

- TO CLEAN OR NOT TO CLEAN? -

Lilian García Alonso-Alba - Julia M Brennan - Nuchada (Joy) Pianprasankit

Introduction to Wet Cleaning Textiles - To Clean or Not to Clean? -

In the field of textile conservation, cleaning treatments are carried out with careful criteria so that the physical appearance and/or chemical composition of the textile are not damaged. Both wet cleaning (washing) and stain removal are NON REVERSIBLE, and therefore must be carefully considered. Of course, cleaning can be beneficial, but here's the warning - the risks often far outweigh the benefits. The effects of cleaning can affect the fibre, colourants, dyes, tensile strength, timestamps, and the integrity of the overall physical structure (Roman, 2016).

> "All conservation action must respect the integrity of the cultural heritage, based on understanding and respect for their subject, bill, construction system, appearance or image, values, meanings, uses, associations and context and consider related social actors with that heritage."
> (Lineamientos CNCPC-INAH, 2013)

Conservation cleaning is not the same as cleaning everyday clothing. For textile specialists and custodians of heritage, there is a code of ethics that guides the practice, including making sure that each action and treatment is carefully studied, tested, and that all work is well documented.

Cleaning is appropriate only in very specific cases when a conservator/specialist concludes that the action is necessary and ethical, after a detailed examination of the textile, its history and condition (Leene, 1972). In some cases, the cleaning of a textile is called for, as a stain or overall mould or soiling is causing continued damage to the object.

Changes in wet-cleaning can occur at three levels:

1. in the construction by modifying/changing the textile,
2. in the appearance by changing its look,
3. in materials that are on or adhered to the textile, by removing material such as dirt and evidence of context.

A systematic and methodological process (such as the one that was carried out in this project) is fundamental to determine the relevance of doing a wet cleaning, in which the characteristics of the textile should be taken into account, as mentioned above, and also the qualities of the selected cleaning agent.

Whether using a chemical or plant-based material, cleaning is a conservation topic that requires extensive and ongoing examination. Therefore, it is within this conservation

framework, that the testing, experimentation and consideration of traditional plant-based cleaners and stain removers were conducted. Knowledge passed down from the elders, wisdom of the forest, long time practices and materials, were subjected to modern scientific testing to determine their merit/applicability.

Protocol

The testing targeted the effects of wet cleaning cotton and silk fabrics using plant-based saponins (a natural surfactant) versus commercial conservation detergents. The goal was to determine the differences between them; which performed better on silk or cotton, and on different kinds of stains. This investigation of saponin plants builds directly on the research compiled in the country reports and plant database; tested saponins were selected from the most widely used in Asia. The analysis is also part of an ongoing research project by a partner institution, the National School of Conservation, Restoration and Museography (ENCRyM) in Mexico, of soap-producing plants, including empirical comparisons of agave fibres and other saponins such as soapnut (*Sapindus saponaria*, native to the Americas, of the same genus as Indonesia's widely known '*lerak*' from the *Sapindus rarak*). Like the Southeast Asian based research, the Mexico based work was initiated to identify rapidly disappearing pre-Hispanic traditional technologies, and the necessity to revive old practices and find ecological alternatives in cleaning processes, for conservation, and for industrial use.

The goal is to demonstrate that saponins and the endemic plants that produce them, can, and should be used, as real alternatives for cleaning textiles. **This research will verify that they are a real alternative for cleaning textiles. The results will guide practice in the future.**

During the three-day lab practicum, participants conducted the cleaning tests, and used visual examination as the method to measure and evaluate the cleaning results. A colourimetric analysis and Grey Scale rating using a standardized equation and L*a*b* values were performed following the visual annotations and observations. Dr Orlando Martinez of ENCRyM assisted Dr Lilian García Alonso to complete the set of tests (see Appendix 4: Quantitative Scientific Results, including grey scale and colourimetry). At the conclusion of the test protocol, there were three cleaned stains for each natural and each commercial detergent, in both cotton and silk, and uncleaned stains and no stains, for comparison. The measurement of colour differences between common detergents and saponins in polar and non-polar stains was done in triads: three measurements per cleaning agent to get an average, in comparison with the uncleaned stains and the stain-free fabrics.

Some Factors for Cleaning: Know your Basic Science!

Step 1: Consider the following factors prior to cleaning:

- Fabric fibre nature, structure and chemical composition
- Stain basic chemical composition (polar, non-polar)
- Dyes, colours and additional chemicals in fabric
- Deterioration level of fabric
- Temperature and timed exposure for cleaning
- Cleaning agent options
- Environment and conservator safety

Step 2: Know the dirt – polar versus non-polar

In order to understand the nature of cleaning, it is first necessary to understand the basic composition of dirt. Common dirt found in textiles can either be **polar** or **non-polar**.

Polar dirt molecules are dipolar and are positive or negative charged (e.g. blood, local mud, sewer water, moulds, silicates, rock forming minerals, proteins, and hydroxides).

Non-polar dirt is adhered to the surface by strong bonds such as Van Der Waals forces, hydrogen bonding, ionic and mechanical bonds (e.g. grease, oils, curry, makeup, wax and paraffin).

Greasy stains do not mix with water because the main interactions between water molecules are hydrogen bonding, and those between oil molecules and fats are Van Der Waals forces.

So, in order to eliminate them, these bonds must be broken down by movement (force) or using a cleansing agent (Martinez, 2001).

Table 1: Examples of Polar and Non-Polar Compounds Affecting Fabric	
Polar	**Non-Polar**
Dust and mud 	Candle wax on clerical garments 
Liquid stains: tea, coffee, wine 	Grease stains (oily food) 

(Source: National School of Conservation, Restoration and Museography Mexico - ENCRyM)

Know your Stain Composition!

Is it polar or non-polar (see table above)

Step 3: How does cleaning work?

Cleaning involves bonds.
Each link involved in Van Der Waals forces, hydrogen bonding, ionic bridges, mechanical bridges, and covalent bonds, is as strong as the thermal agitation needed to remove it from the fibres.

At 25 degrees, the following thermal agitation is needed to break the links:

Van der Waals: 1-5 Kcal/mol
Hydrogen bonding: 20 Kcal/mol
Ionic bonds: 10-20 Kcal/mol
Mechanical bonds: 50-100 Kcal/mol

Step 4: What is a cleaning agent? Industrial vs natural saponin

Industrial Soaps and Detergents
Cleaning agents consist of alkalis, acids, sequestering agents, and surfactants. Industrial soaps are known to cause damage in human watersheds, as well as health problems such as corrosion, irritation, and breathing issues, to name a few.

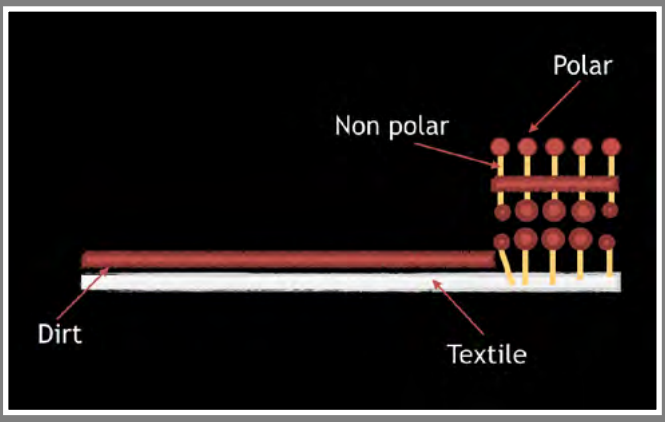
For example, Nonyl Phenol is one of the main components commonly found in detergents such as Canasol, and is used in a wide variety of industrial applications and by conservators worldwide (and one of the cleaning agents tested in this project). It is persistent in the aquatic environment, moderately accumulative, and extremely toxic to aquatic organisms. Nonyl Phenol traces have been found in environmental samples taken from freshwater, saltwater, groundwater, sediment, soil, and aquatic biota.

Table 2: Specifications of Canasol (Nonyl Phenol)

Trade Name	Description	INCI Name *	Appearance at 25°C	Colour	Functions
CANASOL NF 1000	POE (10) Nonyl Phenol	Nonoxynol-10	Liquid	Colourless	Emulsifier, degreaser, detergent, dispersing agent, stabilizer

(Source: Oxiteno technical data sheet. Ultra Group 2015)

Natural Saponin Cleaners



Saponins forming micellar with dirt and water

Saponins are naturally occurring plant glycosides that derive their name from their soap-like properties. Saponin works like an industrial detergent, except that it is pure and natural, without additives. **Saponins do not pollute, and are an environmentally friendly alternative.** They contain phytochemicals that can be found in most vegetables and herbs; in the root, fruit, leaf and bark. They naturally possess soap-like qualities and produce lather (soapy suds) when mixed with water (Fenwick, 1992). Saponins form a micellar when they come in contact with dirt and water, in which one part is non-polar and attaches to the dirt, and the other part (head) is polar and can be carried away by the formation of hydrogen bonding with water (Ventura, 2010). The polar / non-polar composition makes it attractive to the dirt, which attaches itself to the surfactant molecules, and are then removed in the solution. In short, the surfactant is like a "vehicle" that attracts and transports the dirt out with the water.

Different plants have different percentages of saponin content, so some plants work better than others. For example, here are the percentages of saponin tested in three plants:

Table 3: Percentage of Saponin in Three Selected Southeast Asian Plant Materials (Strength of the plant solution is determined by % of saponin content)

Plant	Saponin Percentage
Soapnut (Sapindus rarak fruit)	1.26 %
Fenugreek (Trigonella foenum-graecum seeds)	0.79 %
Fresh Baimee (Litsea glutinosa leaves)	0.10 %

Wet-Cleaning versus stain removal – What's the difference?

- Wet-cleaning: This is when the textile is fully submerged in a solution and rinsed with water. The textile is cleaned overall completely.
- Purpose: To remove overall soiling and/or acidity, if it is causing damage to the textile.
- Stain removal: This is the localized application of a solution to reduce or remove a stain or encrustation.
- Purpose: To remove a localized stain that is causing damage to the textile.

Step 5: Know your fabric!

Cellulose and Protein Fabrics

- Cellulose fabrics, such as cotton, are plant-based and alkaline. They need washing agents that have a pH of 7 or slightly more.
- Protein fabrics, such as silk and wool, are animal products and acidic. They need cleaning agents that have a pH lower than 7, probably 5 or 6.

Step 6: Know about pH

pH scale – potential of Hydrogen

The measure of acidity or alkalinity of the solution

The measure of acidity or alkalinity of the textile

- pH value is scaled from 1 to 14, with pH 7 being the neutral point
- pH values under 7 are acid (1 is most acid)
- pH values over 7 are alkaline or base (14 is most alkaline)

Table 4: pH Compatibility of Natural Saponin Cleaners with Fabrics		
Fabric type	**Cotton (cellulose fabric)**	**Silk (protein fabric)**
Ideal pH for the cleaner	7	5-6
Most suitable saponin cleaner (tested in present study	Soapnut (Sapindus rarak fruit)	Fenugreek (Trigonella foenum-graecum seeds)
	Bồ kết (Gleditsia australis pods)	

Cleaning - Some Facts

- Dye testing is required in advance to see if the colour/dye will come out or bleed during cleaning. If the testing shows the dye will bleed, then DO NOT wet-clean.
- No wet-cleaning for fabrics with metal threads because of corrosion and other complications.
- Wet-cleaning must be done fast; each soaking in or use of cleaner lasting 5-10 minutes. If a fabric is left for too long in the solution with the surfactant, the dirt will go back into the fabric.
- Remember that less is better. There is no need to use more soap if the dirt has already come out.
- Standard conservation cleaning temperature is 25˚ Celsius.
- Wet-cleaning can shrink both cellulose and protein fabrics.
- Wet-cleaning can change the chemical structure of the fabric.
- A wet textile is heavier and more susceptible to damage.

Project Findings

The four plants tested were:

Litsea glutinosa leaves (soft bollygum, bolly beech) from northern Thailand's Phrae Province (locally known as '*baimee*'/ ใบหมี่) – 0.10% saponin content.

Sapindus rarak fruit (soapnut) from Java and Bali, Indonesia (locally known as '*lerak', 'klerek', 'rarak*' or '*rerek*') – 1.26% saponin

Trigonella foenum-graecum seeds (fenugreek) from Thailand (locally known as '*luuksat*' / ลูกซัด) – 0.79% saponin

Gleditsia australis pods from Vietnam (locally known as *bồ kết*)

For further information, including names in other vernacular languages, see the Plants & Methods Database.

Participating researchers completing the database of plants and methods at the Regional Forum in Bangkok in August 2016. (Source: Queen Sirikit Museum of Textiles)

The four commercial detergents tested were:

- **Canasol NF 1000**: ethoxylated akyl phenol
- **Orvus paste**: a Proctor and Gamble synthetic, anionic surfactant with wetting agents detergency, emulsifying and dispersing properties; complete ingredients are difficult to confirm from industry.
- **'Rinske'**: a cleaning agent of three ingredients: a non-ionic surfactant (Triton X or Hostapon SG), a sequestrant (sodium tripolyphosphate) and an emulsifier (carboxymethyl cellulose)
- **Attack Batik Cleaner**, known widely as '**Batik Attack**': a famous clothes cleaner from Indonesia, containing a percentage of soapnut / lerak fruit (13.99%), citric acid and Sodium Lauryl Ether Sulphate (SLES)

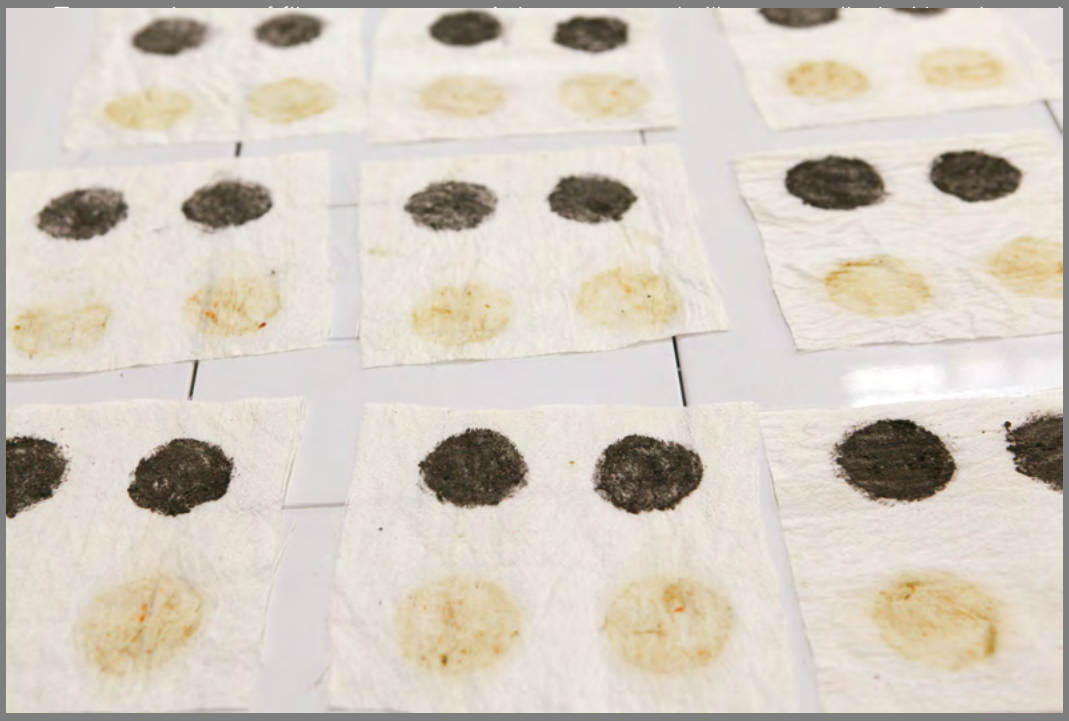
Procedure:

- Four natural saponin recipes were made, following instructions gathered from regional informants. This included cooking, mashing, straining. It takes a lot of work to make surfactant concentrates!

- Four saponin solutions were mixed with 10 ml of concentrate, diluted with distilled water to make 250 ml, gently mixed.

Detergents used for testing were prepared using concentrates mixed with distilled water. (Source: Queen Sirikit Museum of Textiles)

- Four chemical detergents were prepared, using 1-3 drops of standard detergent, mixed with 100 ml of water, and stirred until the solution was totally combined.



Cotton and silk pieces of fabric with polar and non-polar stains prepared for testing.
(Source: Queen Sirikit Museum of Textiles)

- pH measurements were taken of all natural and commercial detergents prepared.
- Two stains (polar and non-polar) were cleaned with the selected saponins on each of the two fabrics (cotton and silk), and the same procedure was repeated with the chemical detergents.
- The cleaning was done with cotton swabs dipped in detergent solution or plant saponin solution and gently rolled onto the stain sample. This was done 3-6 times. Distilled water was used to rinse the stain. This was done 3-4 times.

Testing the pH levels of fenugreek natural detergent.
(Source: Queen Sirikit Museum of Textiles)

Applying the natural and chemical detergent preparations to the stained fabric using gently rolled cotton swabs. (Source: Queen Sirikit Museum of Textiles)

- After cleaning, a piece of absorbent blotter was pressed onto the remaining stain for 5-10 seconds, and then examined for the amount of stain residue and impregnation.

Participating researchers writing down their observations to compare the effects of natural and chemical detergents on polar and non-polar stains on cotton and silk.
(Source: Queen Sirikit Museum of Textiles)

Observations:

This protocol was executed through visual comparisons between the cleaning agents and the effects on the fabric samples, including:

- the importance of the fibre type in relation to the pH of the natural and industrial detergents,
- the success of dirt removal,
- the duration of the cleaning process,
- the effects of the cleaner on the stain, and
- the textile's appearance and texture before and after.

Table 5: Observations from Testing Trial 1 Using Southeast Asian Saponins				
Plant	**Soapnut (Sapindus rarak fruit)**	**Fenugreek (Trigonella foenum-graecum seeds)**	**'Baimee'/ใบหมี่ (Litsea Glutinosa)**	**Bồ kết (Gleditsia australis)**
Part(s) Used	Fruits	Seeds	Leaves	Pods (including seeds)
pH Level	5	5.5	5	6.5
Saponin Content	1.26%	0.79%	0.10%	N/A
Performance on Cotton	Good cleaner for both polar and non-polar stains.	Mild cleaner for both polar and non-polar stains.	Not so efficient for stain removal on both polar and non-polar stains.	Good cleaner for polar stains. Mild cleaner for non-polar stains.
Performance on Silk	Very good cleaner for both polar and non-polar stains.	Very good cleaner for both polar and non-polar stains.	Mild cleaner for polar stains. Not a good removal for non-polar stains.	Mild cleaner for both polar and non-polar stains.
General Observations	Produces more foam than the other tested saponin plants, probably due a higher saponin content. The pH is low (acidic), so it could be neutralized with other plants such as Gleditsia australis.	Performed very well on both types of fabrics and stains. Its pH makes it more adequate for cleaning silk.	It does not seem to clean as much. Its pH is very low, so it could be used as an acidifier on alkaline cleaning solutions.	A mild cleaner, but it has the advantage of an almost neutral pH. It also produces less foam so it does not require as much rinsing.

Testing - Results:

- Preliminary visual observations found that the performance of the plant saponin were as effective as, or better than, the commercial detergents.
- Preliminary visual observations found that the performance of the plant saponin was gentler to the fabric.
- The performance of the saponins was considerably better than the detergents in the cleaning of non-polar stains on silk fabric.
- Clearly some plant-based saponins were more successful than others, as seen in the Colour Scale Ratings (see Appendix 3: Quantitative Scientific Results).

Results of the detergent effects of *bồ kết* on polar and non-polar stains on cotton and silk.
(Source: Queen Sirikit Museum of Textiles)

Table 6: Recommendations of Use for Tested Saponin Plants Based on Visual Observations				
Plant	**Cotton**		**Silk**	
	Visual Observation	**Recommendation**	**Visual Observation**	**Recommendation**
Bồ kết pH 6.5-7	Good for polar cotton.	Y	Good for silk. Very mild so less rinsing required.	YYY
Soapnut pH 5	Very good for polar cotton.	YY	Works very well but too acidic for silk. (Batik Attack left a softer surface)	YYY
Fenugreek pH 5.5	Quality of the cotton looks unchanged. Good for hand woven cotton.	YY	Good pH for silk. Performed relatively well on silk for both polar and non-polar stains. Worked better than *baimee* (row below).	YYY
Baimee pH 5	Too acidic. Cleans polar better than non-polar on cotton. Destroyed the fabric. Does not remove the grease. Low saponin content.	N	Recommended for use on silk for both polar and non-polar stains.	YY
Y - Y - YYY: Levels of recommendation from recommended to highly recommended N: Not recommended				

Test Results Summary

Bồ kết, with a pH of 6.5-7, was an effective cleaner on the polar stains of cotton, but unexpectedly was the mildest, most gentle and effective detergent for silk; producing very little foam, and easy to rinse. Not surprising that *bồ kết* is now being commercially processed for high-end hair products, particularly in Vietnam.

Baimee has the lowest saponin content at 0.10%, a higher pH, and was a good cleaner of both types of stains and fabrics. However, there was a slight visible alteration to the fabric surface.

Fenugreek, with a fairly neutral pH and 0.79% saponin content, did not fully remove either type of stains on the cotton, but was very effective in stain removal on the silk, and did not alter the fabric surface, texture or colour.

Soapnut or *lerak* from Indonesia, with a pH of 5 and the highest content saponin at 1.26% (nearly double that of fenugreek, and ten times that of *baimee*), was the most effective cleaner of both stain types, particularly on cotton.

Also relevant, the saponins with a lower pH (neutral or slightly acid) are more compatible with the silk, which is a protein fabric with a naturally lower pH.

Comparatively, the three commercial detergents commonly used in textile conservation all produced similar results. The Orvus, Rinske (another SLS) and Canasol – all detrimental to the environment – were the most successful in removing grease and stains. Orvus, as predicted, was most effective on the cotton stains. The Rinske performed stain removal about the same as Orvus, but was the easiest to rinse, making it gentler overall for the silks. The Canasol visibly altered the fabric surface, making the silk thin and stiff.

The most successful commercial cleaner was the 'Batik Attack', with a pH of 7, which contains both a small percent of natural saponin and Sodium Lauryl Ether Sulphate (SLES), an anionic detergent and surfactant. It foamed easily, acted fast, removed dirt without any agitation, and was easy to rinse out.

Conclusion

Even with this small set of plant-based detergents, the visual and colourimetric observations, pH levels, and effectiveness of cleaning point to the success and value of natural plant products. They all cleaned well, particularly on silks, and several were faster acting, and easier to rinse than the commercial detergents. Overall, the soapnut, now becoming a more common consumer choice, as well as being adopted by some textile conservators, is the most effective cleaner for both polar and non-polar stains, and activates and rinses quickly. Without damaging the textile or the environment, **it appears to be the most successful cleaner in all categories**. This result matches the widespread cultural practice in Java of using lerak for cleaning traditional cotton batik cloths. These preliminary results are encouraging for the field of textile conservation and care. The use of a natural surfactant available and affordable all over Asia, a continuum of a traditional practice, is a viable alternative to the petroleum-based detergents promoted in 'Western' conservation practices. The 'Batik Attack' worked particularly well on polar stains and on

silk. The success of this cleaner points perhaps to **fabricating a pH 7 custom mix for conservators**; a local plant-based saponin, combined with a small amount of Sodium Lauryl Ether Sulphate, which could perform as the most effective, yet gentle stain remover and overall cleaner.

Stain Removal

Additional plants brought to the the practical session at the regional forum were also tested, but informally and not quantified. The ingredients below were brought by Myanmar representative Ms Aye Mi Sein, Indonesia representative Mr Benny Gratha and SEAMEO SPAFA Programme Secretary Ms Vassana Kerdsupap. These plants were tested for their potential as stain removers, which is the process of locally or selectively treating a specific stain on a textile (not overall wet-cleaning).

Table 7: Results of Plants Used for Stain Removal

Plant Name	Type of Fabric			Method	Result
	Batik	Cotton	Silk		
***Thanaka* wood** *Limonia acidissima*	✓			1. Drip a few drops of water on the (stone slab) grinder 2. Rub the *thanaka* on the grinder until you get a concentrated paste 3. Apply the paste on the stain 4. Dry it naturally or with a hair dryer 5. Leave the *thanaka* to absorb the oil from the stain for about 2 hours 6. Rinse it well with water	**Batik:** Curry stain and dirt stain were totally removed from the batik cloth. The fabric maintained its quality.
Tomato fruit (ripe) *Solanum lycopersicum*	✓	✓		1. Cut a ripe tomato in half 2. Scrub the stain with the tomato 3. Rinse it well with water	**Batik:** Polar and non-polar on the batik fabric were totally removed. The fabric maintained its quality. **Cotton:** Green curry stain was applied to cotton. After rubbing it with the ripe tomato and washing, the fabric's colour became orange.
Kaffir Lime *Citrus hystrix*	✓			1. Select a juicy kaffir lime 2. Cut into two parts 3. Use one half of it to scrub on stain and squeeze juice as well 4. Do it for about 5 to 10 minutes 5. Wash it properly with water	**Batik:** Polar and non-polar were totally removed from the batik fabric. The fabric maintained its quality.

Table 7: Results of Plants Used for Stain Removal (continued)					
Plant Name	**Type of Fabric**			**Method**	**Result**
	Batik	**Cotton**	**Silk**		
Bilimbi *Averrhoa bilimbi*	✓			1. Squeeze belimbing fruits to get juice 2. Apply juice on the stain 3. Leave it for a few minutes 4. Wash it properly with water	**Batik:** Polar and non-polar were totally removed from the batik fabric. The fabric maintained its quality.
E.M. Solution	✓			E.M. Solution ingredients: • 1 green apple • 1 carrot • 1 cucumber • 1 cup honey • 10 cups drinking water E.M. Solution preparation method: 1. Slice fruits and mix together with sugar and water in a container (glass container only) 2. Cover the container very well 3. Place in a bottle to ferment at normal temperature 4. Keep it at least 3 months 5. After 3 months, the solution can be extracted 6. Keep in the refrigerator to maintain the pH of the E.M. Solution **Note 1:** Used fruits can be kept and topped up with water to make more E.M. Solution. **Note 2:** The best for washing is after 1-2 years of fermentation. **Note 3:** It can also be used as a make-up remover.	**Batik:** Polar and non-polar were totally removed from the batik fabric. The fabric maintained its quality.

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ANALYSIS OF SAPONIN IN BAIMEE LEAVES, SOAPNUT FRUIT AND FENUGREEK SEEDS

Which is the Soapiest?

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Abstract:

To support the ethnographic study of plants and methods used in the traditional preservation of textiles in Thailand, three readily available saponin-bearing plants were tested to determine the percentages of saponin content. The three plants were *baimee* (*Litsea glutinosa*), soapnut (*Sapindus rarak*) and *fenugreek* (*Trigonella Foenum-graecum*). These plants were mentioned multiple times in the data set, and two of them are also prevalent throughout Southeast Asia. Research questions included: What are the saponin percentages? Which material has the highest content? Do the simple methods of extraction produce the same yield of saponin? How can this inform the choice as a suitable conservation cleaner?

Extractions were done chemically, to yield the crude extract from each sample; and analysis of saponin content done by measuring the absorbance with uv-vis spectrophotometer, and using Quillaja saponin (Acros Organics Company) as a reference standard. Lab work was conducted at the Department of Chemistry, Faculty of Science, Silpakorn University, Bangkok.

The results point to soapnut having the highest percentage of saponin, nearly double that of fenugreek and ten times more than the *bai mee* leaves. It is no surprise then, that soap nuts are so popular; they are easy to use and yield a healthy and effective amount of saponin for cleaning.

Soapnut saponin	1.26%
Fenugreek saponin	0.79%
Fresh baimee leaves saponin	0.10%

1. Extraction Method

Plant parts were cut into pieces (*bai mee* leaves chopped up, soapnuts pitted) and then extracted in the boiling water, three times.

Use each strained plant solution, extract with ethyl acetate (EtOAc) solvent. Then take the solution out from the water layer.

Secondly, take the solution from the first extraction, and extract with n-butanol solvent and take the solution out from n-butanol layer.

Finally, take the solution from the second step, and evaporate to get the dry total saponins.
The final step yields the total saponin, used as crude saponins extract.

2. Determination of Total Saponins

The determination of Total Saponins was done by vanillin-sulfuric acid method.

2.1 The crude saponins extract was prepared with 0.5 ml into ethanol, vanillin (8%,w/v) 0.5 ml and sulfuric acid (72%v/v) 5 ml.

2.2 Then place them in the ice bowl.

2.3 After that, heat up the mixture in warm water (60°c) for 10 minutes, and replace to ice bowl for 15 minutes.

2.4 Finally, the absorbance was measured with UV-VIS Spectrophotometer, using Quillaja saponin (Acros Organics Company) as a reference standard.

3. Experimental Results

3.1 Extract of Crude Saponins

3.1.1 Extract of Crude Saponins in *baimee* **leaves**

Fresh leaves 200.02 g has crude saponins 0.2042 g

Percentage of extracted (% yield) = 0.2042 x 100/200.02 = 0.10

3.1.2 Extract of crude saponins in **soapnut**

Soap nut 200.30 g has crude saponins 2.5775 g

Percentage of extracted (% yield) = 2.5775 x 100/200.30 = 1.29

3.1.3 Extract of crude saponins in **fenugreek**

Fenugreek seeds 200.25 g has crude saponins 1.8014 g

Percentage of extracted (% yield) = 1.8014 x 100/200.25 = 0.90

3.2 Determination of Total Saponins

3.2.1 Calibration curve from Quillaja saponin reference (Quillaja saponin's molecular weight 487)

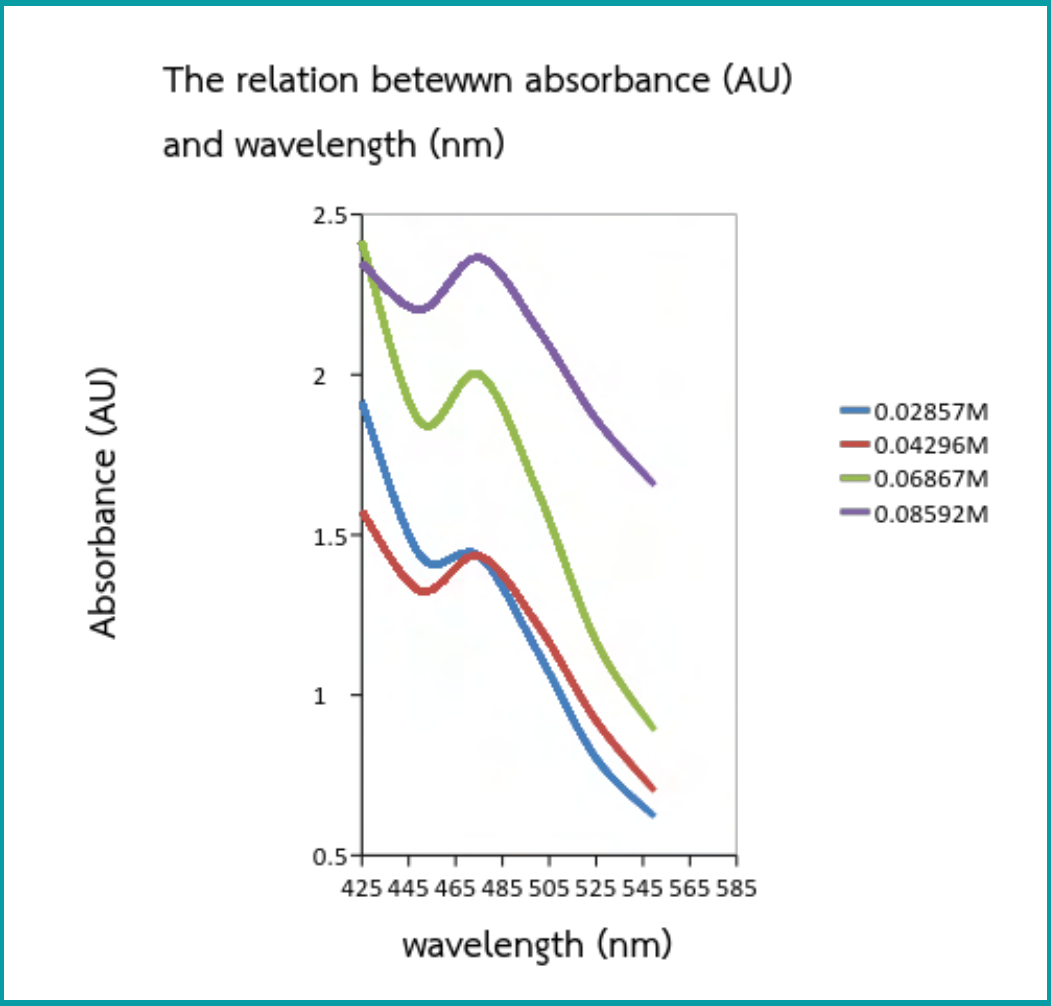
(1) Quillaja saponin 5.0200 g adjust the volume to 10 ml with EtOH
(2) Quillaja saponin 10.0344g adjust the volume to 25 ml with EtOH
(3) Quillaja saponin 5.0200 g adjust the volume to 20 ml with EtOH
(4) Quillaja saponin 5.0082 g adjust the volume to 30 ml with EtOH

Mix Quillaja saponin solution 0.5 ml with 8%(w/v) Vanillin 0.5 ml and 72%(v/v) Sulfuric acid 5.0 ml.

This is the intensive Quillaja saponin solution;

(1) 0.08592 M
(2) 0.06867 M
(3) 0.04296 M
(4) 0.02857 M

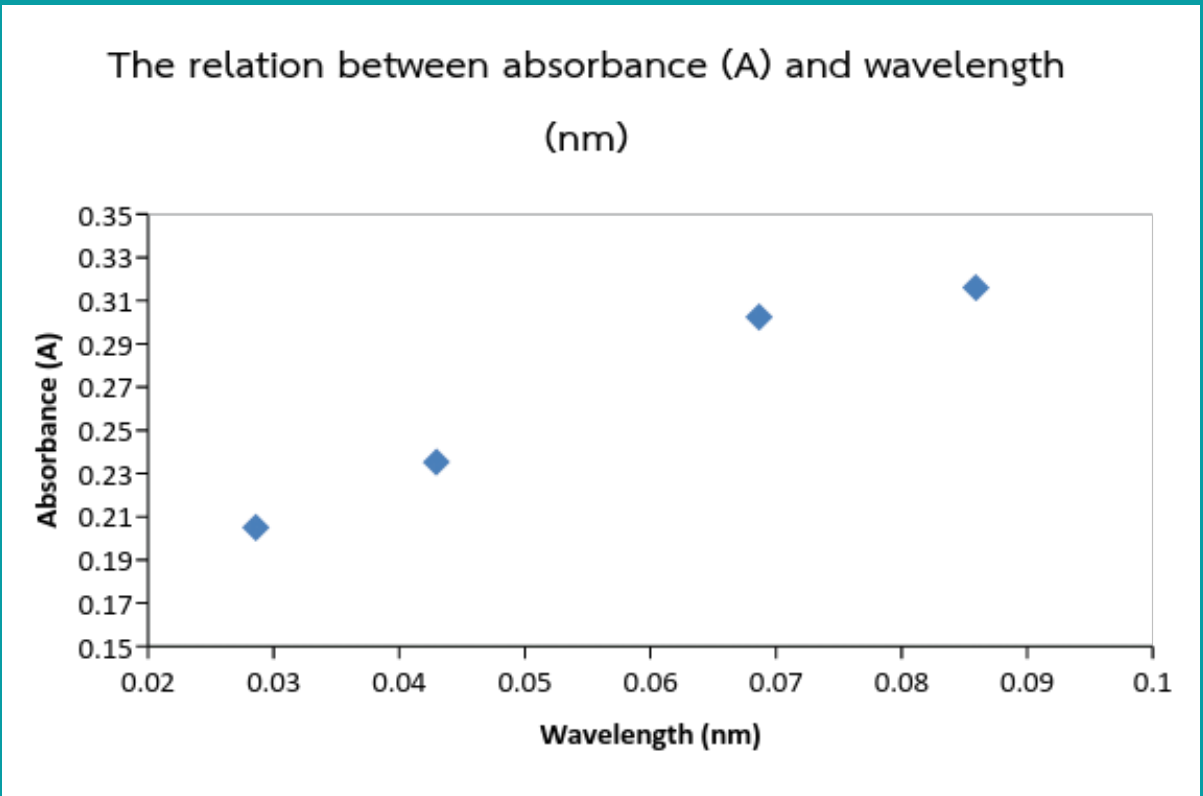
Bring these solutions to test absorption spectrum



Absorption spectrum of Quillaja saponin;

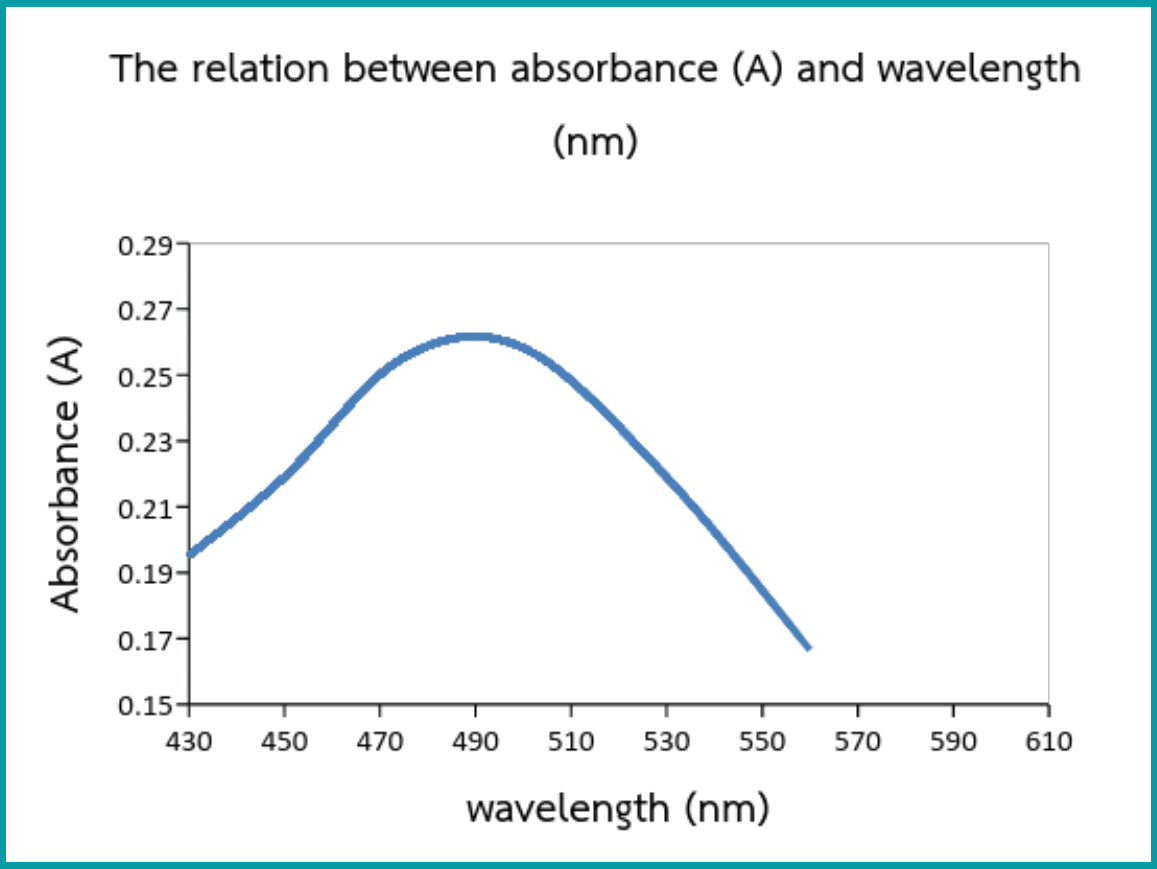
Intensive solution 0.02857M can absorb spectrum λmax (475) = 0.2050
Intensive solution 0.04296M can absorb spectrum λmax (475) = 0.2353
Intensive solution 0.06867M can absorb spectrum λmax (475) = 0.3024
Intensive solution 0.08592M can absorb spectrum λmax (475) = 0.3660

The data is written to calibration curve of Quillaja saponin



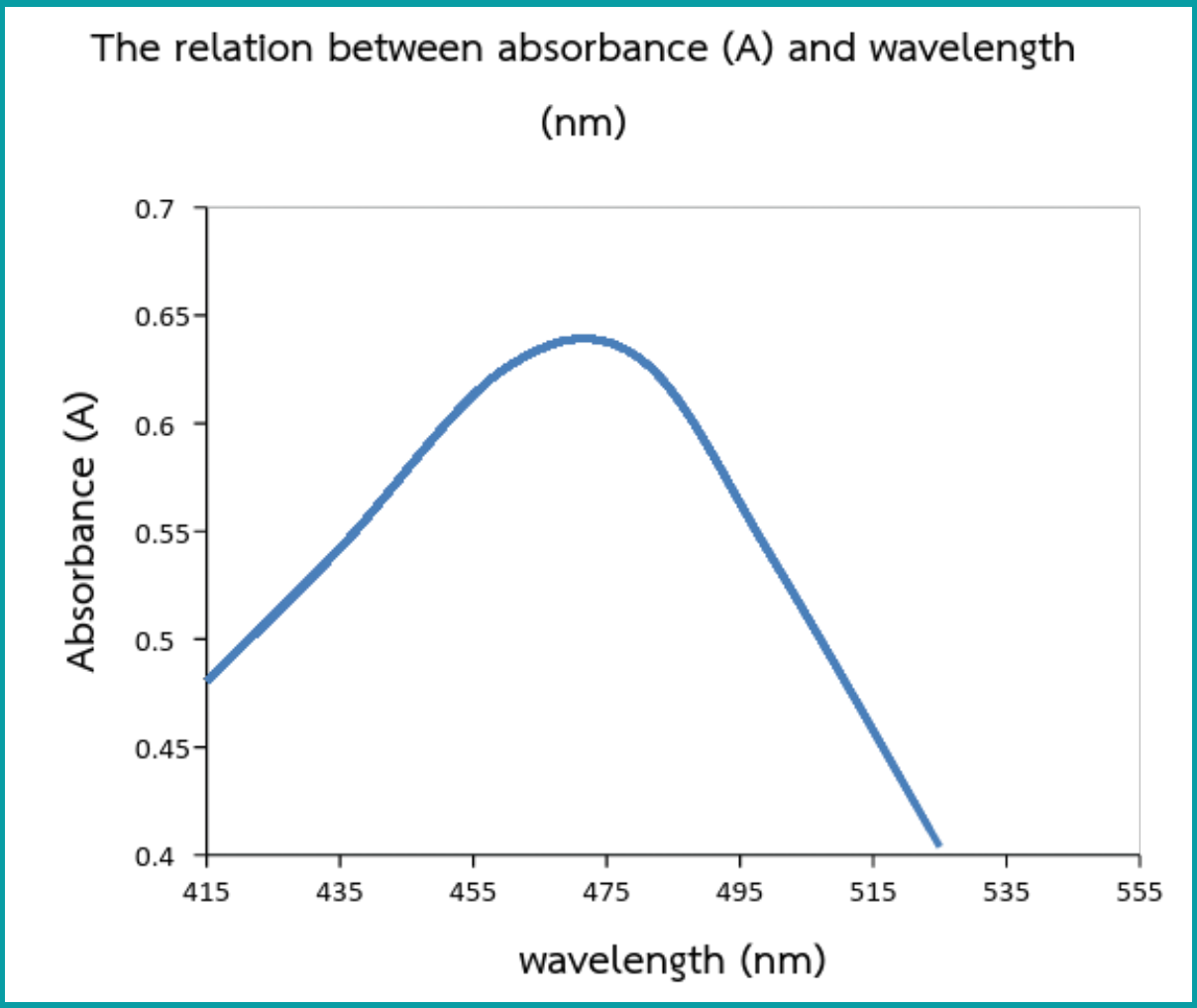
The equation of a straight line of calibration curve is
$y = 2.0402x + 0.1493$
$r^2 = 0.9703$

3.2.2. The Analysis of Simple Plants
Quillaja saponin 5.0200 g adjust the volume to 10 ml with EtOH
(1) 0.2042 g of *baimee* crude saponins extract adjust the volume to 25 ml with EtOH
(2) 0.5075 g of soapnut crude saponins extract adjust the volume to 25 ml with EtOH
(3)0.777 g of fenugreek crude saponins extract adjust the volume to 5 ml with EtOH
Then bring these solutions to test the absorption spectrum



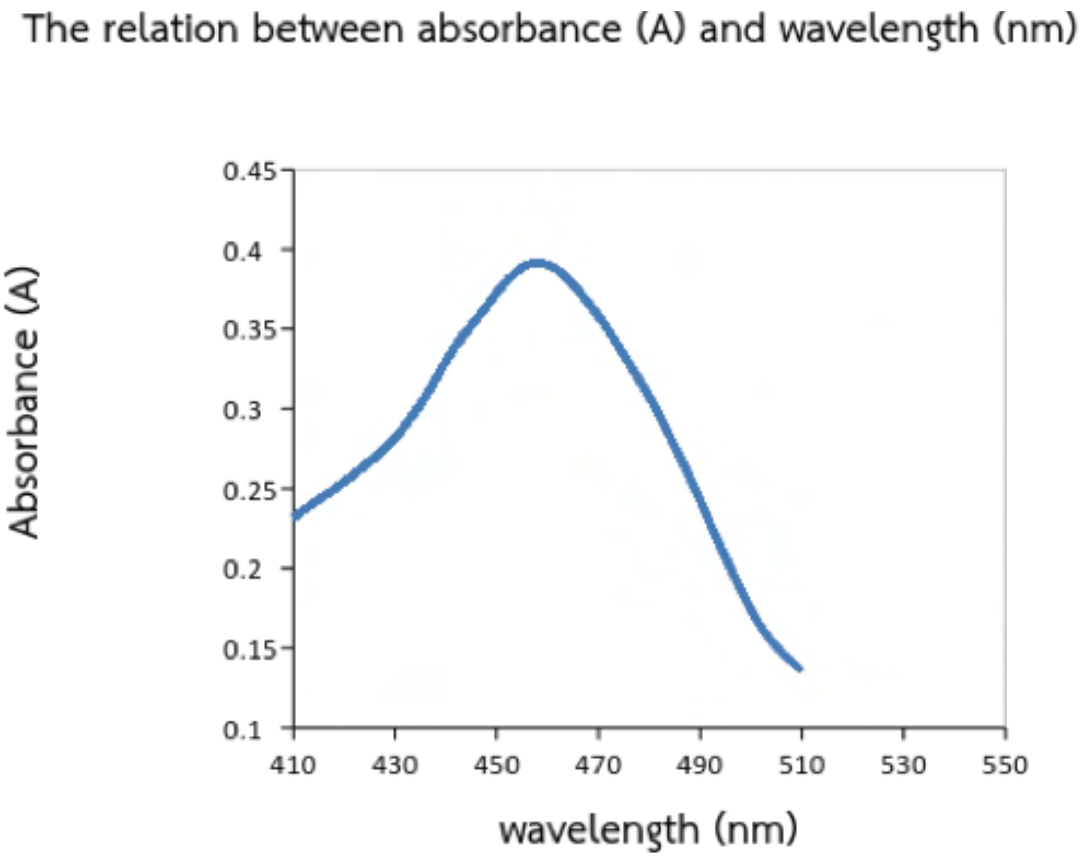
Absorption spectrum of *bai mee*

Double dilute ; λmax = 475 nm Absorbance = 0.16597
From calibration curve ; y = 2.040x + 0.149 r^2 = 0.970
To test the concentration of saponin in *baimee* leaf;
y = 0.16597
x = 0.008319 M
The concentration of saponin in *baimee* = 0.008319 x 2 = 0.01664 M
From the solution 1000 ml has the saponin = 0.01664 x 487 = 8.104 g
So the solution 25 ml has the saponin = 8.104 x 25/1000 = 0.2026 g
Fresh *baimee* leaf 200.02 g has the saponin = 0.2026 g
Fresh *baimee* leaf 100.00 g has the saponin = 0.2026 x 100.00/200.02 = 0.10 g
∴ **The fresh *baimee* leaf has saponin 0.10 %**



Absorption spectrum of soapnut

Double dilute; λmax = 460 nm Absorbance = 0.19062
From calibration curve; y = 2.040x + 0.149 r^2 = 0.970
Testing the concentration of saponin in soapnut
y = 0.19062
x = 0.02040 M
The concentration of saponin in soapnut = 0.02040 x 2 = 0.0408 M
The solution 1000 ml has saponin = 0.0408 x 487 = 19.87 g
The solution 25 ml has saponin = 19.87 x 25/1000 = 0.4968 g
Soapnut 200.30 x 0.5075/2.5775 = 39.44 g has saponin = 0.4968 g
Soapnut 100.00 g has saponin = 0.4968 x 100.00/39.44 = 1.26 g
∴ **The soapnut has saponin 1.26%**



Absorption spectrum of fenugreek

8x dilute ; λmax = 460 nm Absorbance = 0.22029
From calibration curve $y = 2.040x + 0.149$ $r^2 = 0.970$
Testing the concentration of saponin in Fenugreek
y = 0.22029
x = 0.03495 M
The concentration of saponin in Fenugreek = 0.03495 x 8 = 0.2796 M
The solution 1000 ml has saponin = 0.2796 x 487 = 136.2 g
The solution 5 ml has saponin = 136.2 x 5/1000 = 0.681 g
Fenugreek 200.02 x 0.777/1.8014 = 86.27 g has saponin = 0.681 g
Fenugreek 100.00 g has saponin = 0.681 x 100.00/86.27 = 0.79g
∴ **Fenugreek has saponin 0.79%**

4. Analysis Results
4.1 Fresh baimee leaves saponin 0.10%
4.2 Soapnut saponin 1.26%
4.3 Fenugreek saponin 0.79%

Materials
ethyl acetate (EtOAc)
(n-butanol (BuOH)
saponin exact from Quillaja saponaria Molina (Acros Organics Company)
vanillin
sulfuric acid
baimee leaves
soapnut fruits
fenugreek seeds

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APPENDIX

APPENDIX 1 LIST OF INTERVIEWEES

Brunei Darussalam			
Name	**Age**	**Occupation**	**Location**
Hensona Ak Munah	39	-	Rumah Panjang Mendaram Besar, Labi
Kelumeh Ak Umpok	33	X-Ray assistance	Rumah Panjang Mendaram Besar, Labi
Rayadiah Ak Ngawat	35	-	Rumah Panjang Mendaram Besar, Labi
Berika Ak Teliang	67	-	Rumah Panjang Mendaram Besar, Labi
Belayau Ak Jawang	65	-	Rumah Panjang Mendaram Besar, Labi
Lantang Ak Ansam	54	-	Rumah Panjang Mendaram Besar, Labi
Eta Ak Lau	65	-	Rumah Panjang Mendaram Besar, Labi
Ungouk Ak Munah	48	Cleaner	Rumah Panjang Mendaram Besar, Labi
Mina Ak Lungan	40	-	Rumah Panjang Mendaram Besar, Labi
Andan Ak Lungan	61	-	Rumah Panjang Mendaram Besar, Labi

Indonesia (1)			
Name	**Age**	**Occupation**	**Location**
Agus Priyono	41	Batik artist	Depok, West Java
Ali Abubekar Pae	48	Dyer, ikat designer, collector, Director of Museum Tenun Ikat Ende	Ende, East Nusa Tenggara (interview took place in Jakarta)
Azmiah Edy Sunarto	49	Batik artist	Jambi (interview took place in Jakarta)
Bayu Aria	35	Batik artist, lecturer	Yogyakarta (interview by mail)
Elsie Soenarya	81	Textile enthusiast, collector	Jakarta
Indra Tjahjani	61	Batik encourager/ motivator, educator	Bekasi
Mardina Priyana Tarim	71	Textile enthusiast, collector	Jakarta
A. Nurhasyim Hamada	33	Batik artist, designer	Bali (interview took place in Jakarta)
Sri Sintasari Iskandar	70	Collector, connoisseur	Jakarta
Sukarsih	62	Textile conservator	Tangerang, Banten
Sukrismini	54	Dyer, batik instructor	Jakarta
Tri Praptiani Maruto	59	Conservator	Tangerang, Banten

Indonesia (2)			
Name	**Age**	**Occupation**	**Location**
Melati Danes	40	Architect, Designer	Banyuatis, Bali
Tjokorda Gede Yudha Pemayun	55	Cloth Maker, Village Chief	Pejeng, Bali
Agung Antik	50	Cloth maker	Pejeng, Bali
Ni Wayan Kembar	50	Tjokorda's office assistant	Pejeng, Bali
Putri Ayu	37	Cloth Making Workshop Manager	Blah Batu, Ubud, Bali
Dewi	47	Cloth Maker and Seller	Sidemen, Bali

Indonesia (2)			
Name	**Age**	**Occupation**	**Location**
Jojeng / Komang Suartika	44	Cloth Maker and Seller	Klungkung, Bali
I Wayan Sardiana	29	Batik Ikat Worker	Klungkung, Bali
Ni Wayan Sutari	23	BINhouse Bali Employee	Klungkung, Bali
Ida Ayu Ngurah Puniari	55	Traditional Textile Researcher, Writer, Cloth Maker, Reseller	Tenganan, Bali
I Wayan Karya	43	Cloth Maker	Seraya, Bali
Nini	76	Looms thread at Wayan Karya's workshop	Seraya, Bali

Laos			
Name	**Age**	**Occupation**	**Location**
Phouvieng Saisanith	65	Artist	Vientiane
Soi Nanthavongdouangsy	71	Weaver	Vientiane
Chanh Khammanivong	70	Weaver	Vientiane
Khanthong Xaysamonedouangdy	65	Teacher - Weaver	Vientiane
Chitphavan Vichitvongsa	34	Weaving Artist	Vientiane
Chan Vichitvongsa	55	Weaver	Vientiane
Khampor Mingbupha	67	Teacher - Yarn Spinner	Saravanh
Vandara Amphayphone	62	Chemist - Textile Promoter	Luang Prabang
Veomanee Schipani	40	Textile Entrepreneur	Luang Prabang
In Sengsoulitdeth	65	House wife	Oudomxay

Malaysia			
Name	**Age**	**Occupation**	**Location**
Azman bin Zakaria	79	Weaver and Entrepreneur	Kampung Pulau Keladi, Pekan, Pahang
Norakma binti Zakaria	48	Weaver, Designer and Product Manager	Kampung Pulau Keladi, Pekan, Pahang
Hafsin bin Ab. Aziz	52	Weaver, Designer and Entrepreneur	
Hajah Nortipah Abd. Kadir	70	Weaver	Kampung Pulau Keladi, Pekan, Pahang
Hajah Asmah binti Abdul Akhbar	61	Weaver, Designer and Entrepreneur	Kampung Penambang, Kota Bharu, Kelantan
Zubaidah binti Sual	63	Collector and Designer	Kuala Lumpur, Malaysia
Tengku Mariam binti Tengku Muda	76	Housewife	Kampung Gong Serapat, Pasir Puteh, Kelantan
Tuan Haji Yusof bin Abdullah		Director, Terengganu Museum, Researcher and Writer.	Kuala Terengganu, Terengganu

Malaysia			
Name	**Age**	**Occupation**	**Location**
Raja Datin Paduka Fuziah binti Raja Tun Uda		Collector	Kuala Lumpur, Malaysia
Zainon binti Abdullah		House wife	Mersing, Johor – nearby Pekan Pahang

Myanmar			
Name	**Age**	**Occupation**	**Location**
Daw Ni Ni Swe	50	Silk Boutique Owner Weaver	Chan Mya Thar Zi Township Mandalay Division
Daw Ohmar	50	Silk Boutique Owner Weaver	Amarapura Township Mandalay Division
Daw Khin Win Kyi	47	Lecturer/Head of Department Handweaving and Museum Saunders Weaving and Vocational Institute	Amarapura Township Mandalay Division
U Kway Win	70	Director-General (retired) Department of Archaeology Ministry of Culture	Tamwe Township Yangon
U Kyaw Shin Naung	42	Staff Officer National Museum (Yangon)	Yangon
U Aung San Oo	38	Silk and Cotton Weaver Accessories Shop Owner	Amarapura Township Mandalay Division
Daw Tint Tint	47	Principal Saunders Weaving and Vocational Institute	Amarapura Township Mandalay Division
Daw Mai Zarni Mae	30	Research Assistant Department of Fine Arts Ministry of Religious Affairs and Culture Textile Collector	Long Ven Quarter Matupi Chin State
Daw Khin Swe Myint	50	Staff Officer (Store) Department of Fine Arts Ministry of Religious Affairs and Culture	Naw Pyi Taw
U Ye Myat Aung	49	Director Department of Archaeology and National Museum	Nay Pyi Taw

Philippines			
Name	**Age**	**Occupation**	**Location**
Barbara Ofong	56	Weaver	Sitio Tablo, Barangay Lamdalag, Lake Sebu, South Cotabato
Hilda Ugay	53	Weaver	Sitio Tablo, Barangay Lamdalag, Lake Sebu, South Cotabato

Philippines			
Name	**Age**	**Occupation**	**Location**
Subilan Dulay	70	Weaver	Sitio T'bong, Barangay Lamdalag, Lake Sebu, South Cotabato
Subi Nalon	90	Weaver	Sitio Lamkua, Barangay Klubi, Lake Sebu, South Cotabato
Yab Man	58	Weaver	Sitio Lamkua, Barangay Klubi, Lake Sebu, South Cotabato
Monia Tingal	56	Weaver	Sitio Bong, Barangay Lamkade, Lake Sebu, South Cotabato
Gemma Tingal	50	Weaver	Sitio Bong, Barangay Lamkade, Lake Sebu, South Cotabato
Avelina Tingal	56	Weaver	Sitio Bong, Barangay Lamkade, Lake Sebu, South Cotabato
Rosita Tingal	50	Weaver	Sitio Bong, Barangay Lamkade, Lake Sebu, South Cotabato
Fe Paday	60	Weaver	Kabayan Poblacion, Kabayan, Benguet
Saturnina Atinan	50	Weaver	Kabayan Poblacion, Kabayan, Benguet
Juliana Mungon	55	Sewer	Kabayan Poblacion, Kabayan, Benguet
Rosie Pacday	28	Weaver	Kabayan Poblacion, Kabayan, Benguet
Mylene Dalmatio	33	Sewer	Kabayan Poblacion, Kabayan, Benguet
Angelita Pichay Ilul	51	Weaver	Yakan Village, Barangay Upper Kalarian, Zamboanga City
Isnayra Maitoh	34	Weaver	Yakan Village, Barangay Upper Kalarian, Zamboanga City
Salma Balati	55	Weaver	Yakan Village, Barangay Upper Kalarian, Zamboanga City
Agot Tobias	55	Embroiderer	Barangay Sto. Niño, Lumban, Laguna
Magdalena Rosales	60	Embroiderer	Barangay Sto. Niño, Lumban, Laguna
Raquel Eliserio	45	Weaver	Kalibo, Aklan
Anna India dela Cruz-Legazpi	71	Weaver / Designer	Kalibo, Aklan
Nelia Cesar Rogano	50	Weaver	Kalibo, Aklan

Singapore			
Name	**Age**	**Occupation**	**Location**
Genevieve Duggan	-	Textiles Specialist	Interview done via email
http://ivyidaong4.blogspot.sg/search?q=laundry, relates the account of his mother	-	Male, Retiree	Singapore, Information from the website
Tackiri Suppiah (Father) Ari Valakan (Son)	85 50	Owner of the P. Suppiah Laundry shop	Video interview in gallery courtesy of Indian Heritage Centre, National Heritage Board, recorded in 2014
Hairiah Madal	70	Housewife	Lorong Mydin, Singapore
Elsie Wong	50-60s	Textile Conservator	Singapore

Singapore			
Name	**Age**	**Occupation**	**Location**
Sng Ah Chieow	50-60s	Office Cleaner	Singapore
Norhayati Abu	40s	Secretary	Kampung Pasiran, Singapore
Zuraidah Ehsan	40s	Freelance Researcher	Singapore
Teo Sek Eng	40s	Art Trained	Singapore
Tan Ching Yee	30s	Assistant Cataloguer	Singapore

Thailand			
Name	**Age**	**Occupation**	**Location**
Lhamthong Sridu	46	Weaver, Dyer	Bangkok, Thailand
Darunee Chakraphan	N/A	Lecturer	Bangkok, Thailand
Pensri Keawmeesuan	N/A	Government officer	Bangkok, Thailand
Jan Aisong	N/A	Housewife	Phrae, Thailand
Jan	N/A	Housewife	Phrae, Thailand
Peah Jansrikaew	N/A	Housewife	Phrae, Thailand
Pranom Thapang	63	Entrepreneur	Phrae, Thailand
Komol Panichaphan	66	Entrepreneur	Phrae, Thailand
Anukoon Detkard	21	Student	Phrae, Thailand
Leuang Thongsook	N/A	Entrepreneur	Phrae, Thailand
Samneang Khontaisong	67	Housewife	Buriram, Thailand
Toom Boonkroub	54	Housewife	Buriram, Thailand
Noopin Prientaisong	57	Housewife	Buriram, Thailand
Suphab Poonmung	N/A	Housewife	Buriram, Thailand
Term Cheuntaisong	64	Housewife	Buriram, Thailand
Gow Wichedi	66	Housewife	Buriram, Thailand
Weeratham Trakulngernthai	51	Entrepreneur	Surin, Thailand
Ratanasri Naminram	56	Weaver, Dyer	Surin, Thailand
Sod Chookaew	56	Weaver, Dyer	Surin, Thailand
Prateep Phasomsri	45	Weaver	Surin, Thailand

Timor-Leste			
Name	**Age**	**Occupation**	**Location**
Alcina Freitas	64	Group leader, dyer, weaver, designer	Maina II /Lautem
Christina Soares	76	Group leader, dyer, weaver, designer	Serelau / Lautem
Filomena Soares	-	Group leader, dyer, weaver, designer	Serelau / Lautem
Joao Moniz	77	Traditional Speaker	Serelau / Lautem
Mariana da Costa	37	Group leader, dyer, weaver, designer	Serelau / Lautem
Marila da Costa	75	Group leader, dyer, weaver, designer	Serelau / Lautem
Olinda Moniz	-	Traditional Dance Trainer	Serelau / Lautem

Timor-Leste			
Name	**Age**	**Occupation**	**Location**
Rita da Costa	55	Group leader, dyer, weaver, designer	Serelau / Lautem
Rosalina Ximenes	50	Group leader, dyer, weaver, designer	Serelau / Lautem
Maria Madalena & Henrique da Cruz	55+	Tutuala elders	Tutuala / Lautem

Vietnam			
Name	**Age**	**Occupation**	**Location**
Pham Thi Duong	54	Farmer	Hai Duong Province
Ama Chi	63	Farmer	Buon Me Thuot
Lo Thi Man	70	Weaver & Dyer	Thanh Hoa
Ha Thi Tham	65	Weaver & Dyer	Thanh Hoa
Dieu Thi Xieng	55	Retired	Yên Bai
Nong Thi Son	56	Weaver	Yên Bai
Lo Thi Nom	52	Farmer	Yên Bai
Ha Thi Kho	86	Farmer	Yên Bai

APPENDIX 2: LIST OF PARTICIPANTS

LIST OF PARTICIPANTS

SEAMEO SPAFA-QSMT TEXTILE CONSERVATION ACTIVITIES 2012-2018

SEAMEO SPAFA - QSMT Regional Forum

Traditional Methods in Textile Preservation in Southeast Asia

23-25 August 2016, Bangkok, Thailand

Regional Forum participants, 23-25 August 2016, QSMT, Bangkok, Thailand.

Ms Hajah Siti Norhayatty binti Haji Morni
Scientific Officer
Brunei Museums Department
Bandar Seri Begawan, Brunei Darussalam

Ms Aziah binti Haji Ahmad
Conservation Officer
Brunei Museums Department
Bandar Seri Begawan, Brunei Darussalam

Mr Benny Gratha
Curator
Museum Tekstil
Jakarta, Indonesia

Ms Annissa Gultom
Co-Director
Tribuana Musea Komunika
Jakarta National History Museum
Jakarta, Indonesia

Ms Viengkham Nanthavongdouangsy
Weaver, Fashion Designer, Writer
Phaeng Mai Gallery, KHANG Centre of Fine Silk
Vientiane, Laos

Mr Mohd Syahrul Bin Ab Ghani
Deputy Director / Curator
National Textile Museum
Department of Museums Malaysia
Kuala Lumpur, Malaysia

Ms Aye Mi Sein
Deputy Director
National Museum (Naypyitaw)
Ministry of Religious Affairs and Culture
Republic of the Union of Myanmar

Mr Allan S Alvarez
Museum Researcher I
Anthropology Division
National Museum of the Philippines
Manila, Philippines

Ms Siti Suhailah Salim
Assistant Conservator (Textiles)
Heritage Conservation Centre
National Heritage Board
Singapore

Mr Wuttikai Phathong
Founder
Kaewanna Natural Indigo
Phrae Province, Thailand

Mr Claudio Marques Cabral
Technical Staff
National Directorate of Museum
State Secretary for Arts & Culture
Ministry of Tourism, Arts & Culture
Dili, Timor-Leste

Mr Fernando Sousa Lay
Museum Staff
National Directorate of Museum
State Secretary for Arts & Culture
Ministry of Tourism, Arts & Culture
Dili, Timor-Leste

Ms Quyen Thi To Hoang
Head of Conservation Department
Vietnam Museum of Ethnology
Hanoi, Vietnam

Dr Lilian García Alonso-Alba
Conservator / Lecturer
National Autonomous University of Mexico (UNAM)
National School of Conservation, Restoration and Museography (ENCRyM)

Ms Linh Anh Moreau
Programme Officer
SEAMEO SPAFA

Ms Vassana "Noi" **Kerdsupap**
Programme Secretary
SEAMEO SPAFA

Mr Siriwat "Yo" **Pokrajen**
Documentation Officer
SEAMEO SPAFA

Mr Kanal "Jerry" **Khiev**
Assistant Documentation Officer
SEAMEO SPAFA

Ms Julia M. Brennan
Conservator
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Nuchada "Joy" **Pianprasankit**
Conservator
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Yaowalak "Yao" **Bunnag**
Conservator
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Wiraporn "Wii" **Suwadeepathompongs**
Registrar
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Ploypailin "Ploy" **Thapepong**
Registrar
Registration and Conservation Division
Queen Sirikit Museum of Textiles

SEAMEO SPAFA - QSMT Regional Forum

Contrasting Textile Conservation Methods for Southeast Asia

7-13 November 2012, Bangkok, Thailand

Workshop participants, 7-13 November 2012, QSMT, Bangkok, Thailand.

SEAMEO SPAFA Project Leader Dr Patcharawee "Jay" Tunprawat (left)

and

QSMT Project Leader Ms Parichat "Tang" Saengsirikulchai (right).

Ms Aziah binti Haji Ahmad
Conservation Officer
Brunei Museums Department
Bandar Seri Begawan, Brunei Darussalam

Ms Jah Siti Rogayah binti Haji Sapar
Museum Assistant
Brunei Museums Department
Bandar Seri Begawan, Brunei Darussalam

Mr Soun Vannsidanel
Textile Conservation Staff
National Museum of Cambodia
Phnom Penh, Cambodia

Mr Benny Gratha
Curator
Museum Tekstil
Jakarta, Indonesia

Mr Slamet
Conservation and Restoration Staff
Museum Nasional
Jakarta, Indonesia

Ms Vilayvanh Vilatham
Museum Assistant
Lao National Museum
Vientiane, Laos

Mr Khamchanh Souvannalith
Traditional Arts and Ethnology Center
Luang Prabang, Laos

Ms Kartina binti Abdul Khalid
Assistant Curator
National Textile Museum
Department of Museums Malaysia
Kuala Lumpur, Malaysia

Ms Suriati binti Sulong
Registration Division
Department of Museums Malaysia
Kuala Lumpur, Malaysia

Ms Khin Htet Wai
Assistant Lecturer (Painting)
National University of Arts and Culture
(Mandalay)
Department of Fine Art
Ministry of Religious Affairs and Culture

Dr Ana Maria Theresa P. Labrador
Assistant Director
National Museum of the Philippines
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Ms Erline S Millar
Textile Conservator
Chemistry and Conservation Laboratory
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Ms Siti Suhailah Salim
Assistant Conservator (Textiles)
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Mr Yutthanawarakorn Saengaram
Curator
National Museum
Bangkok, Thailand

Ms Yaovares Joonveranong
Curator
King Prajadhipok Museum
Bangkok, Thailand

Ms Ketsaraporn Phanthoop
Conservator
HRH Princess Sirindhorn's Secretary's Office
Baan Suan Pratum Museum
Bangkok, Thailand

Ms Panadda Saengcharoen
Collection Manager
Bureau of the Royal Household
Grand Palace
Bangkok, Thailand

Mr Bunchai Thongchareonbuangam
Collection Manager
Bureau of the Royal Household
Grand Palace
Bangkok, Thailand

Ms Lampoon Poupancha
Lecturer
Queen Savang Vadhana Foundation
Srapathum Palace
Bangkok, Thailand

Ms Sureeporn Chotidhammo
HRH Princess Orathai Thepkanya Resident
Hall
(Museum of Ancient Textiles)
Vimanmek Mansion, Dusit Palace
Bangkok, Thailand

Ms Wipawee Tiyaves
Curator
Tilleke and Gibbins Textile Gallery
Bangkok, Thailand

Mr Faustino Dos Santos
Chief
Department of Cultural Creative Industries
Office of the State Secretary of Arts and Culture
Dili, Timor-Leste

Mr Joao Fatima da Cruz
Office of the State Secretary of Arts and Culture
Dili, Timor-Leste

Ms Nguyen Thi Tuan Linh
Objects Conservator
Vietnam Museum of Ethnology
Hanoi, Vietnam

Ms Nguyen Thi Tuyet
Vietnamese Women's Museum
Hanoi, Vietnam

Dr Patcharawee "Jay" **Tunprawat**
Specialist in Cultural Heritage Management
SEAMEO SPAFA

Ms Vassana "Noi" **Kerdsupap**
Programme Secretary
SEAMEO SPAFA

Ms Kantanach Chayapong
Executive Secretary
SEAMEO SPAFA

Mr Nipon Sud-ngam
Audio-visual Technician
SEAMEO SPAFA

Ms Wilasinee Thabuengkarn
Administrative Officer
SEAMEO SPAFA

Ms Julia M. Brennan
Conservator
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Parichat "Tang" **Saengsirikulchai**
Co-Founder
FeatureOne Limited Partnership
Ayutthaya, Thailand

Ms Piyamon "Oom" **Kingpratoommas**
Conservator
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Ms Yaowalak "Yao" **Bunnag**
Conservator
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Ms Wiraporn "Wii" **Suwadeepathompongs**
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Ms Ploypailin "Ploy" **Thapepong**
Registrar
Registration and Conservation Division
Queen Sirikit Museum of Textiles

Mr Kunlanan "Kun" **Kantharos**
Registrar
Registration and Conservation Division
Queen Sirikit Museum of Textiles

APPENDIX 3 QUANTITATIVE SCIENTIFIC RESULTS

Grey Scale rating using a standardized equation and L*a*b* values				
#	sample	L*(D65)	a*(D65)	b*(D65)
1	Polar stain on silk	49.98	3.36	10.8
2	Non-polar stain on silk	82.42	0.49	28.82
sample name: cleaning agent/stain type/fibre				
3	Canasol/polar/silk	76.93	2.18	10.78
4	Canasol/non-polar/silk	85.8	-0.55	18.42
5	Orvus/polar/silk	76.1	2.02	10.32
6	Orvus/non-polar/silk	85.19	0.01	17.15
7	Batik attak/polar/silk	79.45	1.86	9.2
8	Batik attak/non-polar/silk	88.61	-1.03	15.24
9	Rinske/polar/silk	83.91	1.19	9.43
10	Rinske/non-polar/silk	88.62	-0.72	15.48
11	Polar stain on cotton	51.82	3	10.09
12	Non-polar stain on cotton	79.38	0.75	31.07
sample name: cleaning agent/stain type/fibre				
13	Canasol/polar/cotton	71.61	2.41	10.49
14	Canasol/non-polar/cotton	80.78	0.97	26.7
15	Orvus/polar/cotton	76.09	2.28	10.01
16	Orvus/non-polar/cotton	80.12	0.35	25.19
17	Batik attack/polar/cotton	81.47	1.97	9.28
18	Batik attack/non-polar/cotton	82.03	0.37	19.1
19	Rinske/polar/cotton	75.64	2.23	9.51
20	Rinske/non-polar/cotton	83.3	0.29	22.33
21	Fenugreek/polar/silk	79.95	1.31	10.22
22	Fenugreek/non-polar/silk	87.07	-0.98	16.48
23	Lerak/polar/silk	75.42	2.25	11.35
24	Lerak/non-polar/silk	86.9	-0.47	16.73
25	Bo ket/polar/silk	76.24	1.71	13.11
26	Bo ket/non-polar/silk	85.11	-0.2	18.63
27	Baimee/polar/silk	77.43	1.98	10.07
28	Baimee/non-polar/silk	86.43	-0.62	17.71
29	Fenugreek/polar/cotton	78.38	1.99	11.81
30	Fenugreek/non-polar/cotton	81.97	-0.56	26.17
31	Lerak/polar/cotton	77	2.15	9.88
32	Lerak/non-polar/cotton	81.73	-0.2	21.1
33	Bo ket/polar/cotton	75.58	1.78	12.57
34	Bo ket/non-polar/cotton	79.3	0.17	25.91
35	Baimee/polar/cotton	71.37	2.42	9.96
36	Baimee/non-polar/cotton	80.74	-0.19	26.81
37	Silk	91.61	0.01	8.24
38	Cotton	86.36	1.68	10.75

The greyscale is used to evaluate cleaning on the textile. This is mainly used to evaluate blemishes once they have been cleaned. They are usually compared to a piece of the same fabric that is not stained to compare with the samples, then subjected to similar and determined washing conditions to observe the results.

Colours on polar stains after cleaning			Colours on non-polar stains after cleaning		
#	Sample	Color on silk	#	Clave	Color on silk
3	Canasol/polar/silk		4	Canasol/non-polar/silk	
5	Orvus/polar/silk		6	Orvus/non-polar/silk	
7	Batik attak/polar/silk		8	Batik attak/non-polar/silk	
9	Rinske/polar/silk		10	Rinske/non-polar/silk	
21	Fenugreek/polar/silk		22	Fenugreek/non-polar/silk	
23	Lerak/polar/silk		24	Lerak/non-polar/silk	
25	Bo ket/polar/silk		26	Bo ket/non-polar/silk	
27	Baimee/polar/silk		30	Baimee/non-polar/silk	

Results in silk fabric interpreted in a scale of colour.

APPENDIX 4: LITERATURE REVIEW

LITERATURE REVIEW

by Matt Francis

Before They Are Gone:
Capturing and Sharing the Traditional Methods of Textile Preservation in Thailand

Contents

Project Abstract

This research project brings together scientifically trained textile conservators and Thai elders in an exchange of current and outdated textile preservation practices. Textiles are an integral part of Thai culture and history, and yet weavers and older practitioners, along with traditional practices of textile care, are dying out. The methods and materials used in traditional textile preservation are part of the underpinnings of present day textile conservation knowledge, providing a link to heritage and history. Moreover, the traditional knowledge provides possible innovations for today's conservators, as well as a sense of identity by recognizing these tried old methods as part of Thai textile preservation history. The information is based on data gathered from thirty informants from rural and urban regions, as well as the royal court, regarding methods and materials used for storage, cleaning and stain removal, mould, insect, and rodent mitigation, as well as local customs and beliefs associated with textile care.

Introduction

This paper seeks to summarize and critically review existing academic literature in the fields of preserving indigenous knowledge, textile conservation, and establishing protocols for indigenous participation in conservation projects. The research project "Before They Are Gone: Capturing and Sharing the Traditional Methods of Textile Preservation in Thailand" will serve to bridge many gaps both within these subsets of conservation literature, as well as between them. Part 1 will focus on the development of academic literature in the areas of indigenous rights, conservation of indigenous knowledge and indigenous intellectual property. Part 2 will focus on existing literature on traditional plant uses and textile conservation methods.

Part 1: Literature on Indigenous rights, knowledge and intellectual property

Academic literature on indigenous knowledge is still very much limited in scope and depth, but with good reason. In a paper prepared for the Canadian National Working Group on Education and Minister of Indian Affairs, Dr Marie Battiste summed up the challenges in the academic study of indigenous knowledge: "Indigenous knowledge comprises the complex set of technologies developed and sustained by indigenous civilizations. Often oral and symbolic, it is transmitted through the structure of indigenous languages and passed on to the next generation through modeling, practice, and animation, rather than through the written word. In the context of indigenous knowledge, therefore, a literature review is an oxymoron because indigenous knowledge is typically embedded in the cumulative experiences and teachings of indigenous peoples rather than in a library. The second point is that conducting a literature review on indigenous knowledge implies that Eurocentric research can reveal an understanding of indigenous knowledge. The problem with this approach is that indigenous knowledge does not mirror classic Eurocentric orders of life. It is a knowledge system in its own right with its own internal consistency and ways of knowing, and there are limits to how far it can be comprehended from a Eurocentric point of view." (Battiste 2002)

It is perhaps due to these challenges that literature in the areas of theory and ethics regarding indigenous knowledge is still much larger than that of practical applications, protocols and case studies.

The broader field of indigenous rights follows a clear progression from protection of tangible heritage to intangible heritage. More recent literature on preservation of indigenous knowledge has its roots in scholarly work on repatriation of archaeological artefacts (Burnet 2007) and establishing participatory relationships with indigenous groups for museum exhibits (Sleeper-Smith 2009; Johnson 2005).

In the last decade of twentieth century, more and more literature emerged, challenging the suppression of indigenous knowledge, underscoring the importance of bringing it into the mainstream to establish a body of knowledge that can be drawn on for the common good. This acceptance of indigenous knowledge by scholars and policy makers generated an explosive growth in the number of publications on the relevance of indigenous knowledge in a variety of policy sectors and academic disciplines. international policy makers proceeded to develop principles and guidelines for protecting indigenous knowledge from those who would exploit it (Vandana 1997).

The standards for respecting indigenous knowledge are better developed internationally than they are on an individual country basis. The international standards include the United Nations' *Principles and Guidelines for the Protection of the Heritage of Indigenous Peoples* (Daes 1995; Daes 1993), *Convention on Biological Diversity* (UNEP 1992) and *Science for the Twenty-First Century: A New Commitment* (UNESCO 2000). Indigenous scholars and human rights experts in the United Nations Sub-Commission on the Elimination of Discrimination and Protection of Minorities have elaborated and ratified the *Principles and Guidelines for the Protection of the Heritage of Indigenous People*. These principles provide a holistic context and related research agenda for indigenous knowledge. They acknowledge that the heritage of an indigenous people is a complete knowledge system with its own concepts of epistemology, and its own scientific and logical validity. They also acknowledge that diverse elements of an indigenous people's heritage can be fully learned or understood only by means of the teaching traditionally employed by these peoples themselves (Daes 1993). Indigenous knowledge comprises all knowledge pertaining to a particular people and its territory, the nature or use of which has been transmitted from generation to generation. This knowledge includes "all kinds of scientific, agricultural, technical and ecological knowledge, including cultigens, medicines and the rational use of flora and fauna." (Ascher 1991). The principles elaborated by the UN sub-commission have been incorporated in the International Labour Organization Convention 169, by the educational sector of UNESCO, and in the *Indigenous Treaty on the Declaration of Indigenous Rights* (Smith et al. 2009).

In the scientific arena, indigenous scholars and advocates have stimulated a particular interest in the contribution of indigenous knowledge to a better understanding of sustainable development. Knowledge of the environment is being lost in communities around the world, and there is an urgent need to conserve this knowledge to help develop mechanisms to protect the earth's biological diversity. The United Nations Convention on Biological Diversity recognises the importance of indigenous knowledge to the conservation and sustainable use of biological diversity, acknowledges the contributions of indigenous knowledge as innovative approaches to environmental studies, and recognises the validity of indigenous science. It also recognises the value of indigenous knowledge, innovations, and practices to scientific knowledge, conservation studies, and sustainable development (Clarkson et al. 1992). In 1999 the World Conference on Science, assembled under the aegis of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU), urged governments to promote understanding of indigenous knowledge systems. Conference participants requested the sciences to respect, sustain, and enhance traditional knowledge systems and recommended that scientific and traditional knowledge should be integrated into interdisciplinary projects dealing with links between culture, environment, and development (Declaration on Science and the Use of Scientific Knowledge, paragraphs 32 and 83-87).

This embrace of the value of indigenous knowledge has led a subset of literature devoted to protecting that knowledge from exploitation as intellectual property (Vermeylan et al. 2008). This literature subset addresses the incongruities between Western intellectual property law and the functioning and context of indigenous knowledge (Recht 2009). The solutions to potential commercial expropriation or other exploitation offered by this literature subset overwhelmingly involve developing participatory relationships with communities in projects that aim to derive benefit from indigenous knowledge, whether that benefit is for profit or furthering our understanding of academic subjects (Seminguit 2006).

The relatively new enthusiasm for the preservation and adoption of indigenous knowledge has led to a well established international framework of theory, ethics and guidelines. The field, however, is by no means institutionalized either by educational systems or via thorough protocols for fieldwork and scientific study. Efforts to add indigenous knowledge to the canon of Western knowledge are common in some subject areas, such as ecological conservation, but are rare in many others. Projects to preserve indigenous knowledge abound, but are often undertaken in a highly specific fashion, without the aim of establishing protocols that can be applied to similar projects. Part 2 of this paper will address the potential for this research project to merge traditional Thai techniques of textile preservation to the established Western knowledge of the subject. Part 3 of this paper will examine what existing projects can provide lessons or guidance for this research project, and to what extent protocols have been or still need to be established.

Part 2: Literature on traditional plant uses and textile conservation methods

"Before They Are Gone" seeks to not only document and preserve traditional Thai methods of textile conservation, but also to identify areas where these methods can be reinvented, merged with, or serve as alternatives to Western practices. The project will analyze the chemical composition of 39 different Thai plants and the traditional methods associated with them for cleaning, perfuming, storing and mitigating insect damage for cotton and silk textiles.

There is a small body of literature on the general uses of Thai plants, as well as shared scientific properties (Yahya et al. 2008). One such shared property that has drawn scientific attention is the antimicrobial activity present in many Thai plants that makes numerous species useful as cleaning agents or insect mitigants (Chaisawadi et al. 2005). The active ingredient of several of the plants included in the study are saponins, a class of chemical compounds grouped phenomenologically by the soap-like foaming they produce when shaken in aqueous solutions. Studies exist on the use of saponin-containing plants generally for conservation

and textile cleaning purposes. Woods containing saponins have also been studied for their insect mitigating qualities. Thai plant species included in this research project that contain saponins and whose uses have been studied on an individual basis are sterculia (*Securidaca inappendiculata*) (Wang 1986), soap nut (*Sapindus rarak*) (Bhatnagar 1975), and turmeric (*Curcuma longa*) (Jilani et al. 1983), although much more of the studies concentrated on the use of tumeric as a traditional dye than on its use as a cleaning agent.

This research project examines the traditional uses of lime (*Citrus x aurantifolia*), kaffir lime (*Citrus hystrix*), tamarind (*Tamarindus indica*) and vinegar as stain removers, antimicrobial agents and insect mitigants. With the exception of tamarind, the body of literature on the conservation uses of these plants focuses on the active ingredients of citric acid and acetic acid, rarely mentioning the plants themselves. Studies on the use of citric acid in preservation and conservation are quite broad, ranging from cleaning porcelain artefacts to removing corrosion buildup on metals. The subset devoted to citric acid's use in textile cleaning is substantial, covering subjects like citric acid's ability to remove yellowing of stored fabrics (Yellowing of stored garments solved 1984), preventing the further detonation of excavated textiles (Thakor 1973), and its traditional use to care for silks (Prabhu et al. 1993). Literature on tamarind contains general studies of the plant's properties, uses and chemical nature, but is not limited to such (Chandini et al. 2008). The subset on tamarind's conservation uses covers specific projects, most notably in cleaning, preserving and restoring certain types of South Asian paintings, such as Tanjore paintings in India (Harinarayana 1981; Agrawal et al. 1991). This project's examination of several citric acid and acetic acid containing plant species presents a clear opportunity to merge traditional Thai knowledge of conservation techniques with the substantial body of literature on these active ingredients.

The "Before They Are Gone" research project covers a variety of Thai plants used traditionally as insect mitigators and storage aids, including chilli pepper, black pepper, cinnamon, fenugreek, camphor and tobacco. These plants have all been subject to both historical and chemical studies of their use as mitigators of insect damage (Samidi et al. 1993; Su 1978). In addition to insect mitigation, several of these plants have been a part of studies devoted to environmentally friendly alternatives to corrosion inhibitors (Cappitelli et al. 2011; Srivastava 1981) and preventative storage measures against the spread of mould and fungi (Chingduang et al. 1995). Literature on camphor has a unique subset related to its use as a traditional means of preventing mould, fungi and other deterioration of periodicals, papers and palm leaf manuscripts (Plumbe 1958; Dhawan 1995; Gupta 1974). This subset of plants used for insect mitigation and storage preservation stand apart from the other plants covered in this research project, as there has already been some academic efforts to merge indigenous practices with western techniques and even to offer traditional methods as environmentally friendly and sustainable alternatives.

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APPENDIX 6: PLANT DATABASE PHOTOGRAPH CREDITS

Plant name	Photograph Credit
Acacia concinna	Vassana Kerdsupap / SEAMEO SPAFA
Aleurites moluccana	Allan S Alvarez / National Museum of the Philippines
Ananas comosus	Allan S Alvarez / National Museum of the Philippines
Annona muricata	Benny Gratha
Averrhoa bilimbi	Benny Gratha
Benincasa hispida	Vassana Kerdsupap / SEAMEO SPAFA
Camellia sinensis	Benny Gratha
Capsicum frutescens	Linh Anh Moreau / SEAMEO SPAFA
Carica papaya	Linh Anh Moreau / SEAMEO SPAFA
Cinnamomum burmanii	Nipon Sud-Ngam / SEAMEO SPAFA
Citrus hystrix	Linh Anh Moreau / SEAMEO SPAFA
Citrus japonica	Nipon Sud-Ngam / SEAMEO SPAFA
Citrus medica	Benny Gratha
Citrus x aurantiifolia	Benny Gratha
Clitoria ternatea	Linh Anh Moreau / SEAMEO SPAFA
Curcuma longa	Nipon Sud-Ngam / SEAMEO SPAFA
Cymbopogon nardus	Vassana Kerdsupap / SEAMEO SPAFA
Gleditsia australis	Queen Sirikit Museum of Textiles
Indigofera spp.	Northeastern Thailand: Vassana Kerdsupap / SEAMEO SPAFA
Limonia acidissima	Aye Mi Sein / Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar
Litsea glutinosa	Queen Sirikit Museum of Textiles
Luffa acutangula	Nipon Sud-Ngam / SEAMEO SPAFA
Morinda citrifolia	Benny Gratha
Musa acuminata	Linh Anh Moreau / SEAMEO SPAFA
Nicotiana tabacum	National Directorate of Museum, State Secretariat for Arts and Culture, Timor-Leste
Ocimum basilicum	Linh Anh Moreau / SEAMEO SPAFA
Oryza sativa	Ash/Lye: Quyen Thi To Hoang / Vietnam Museum of Ethnology Cooked Rice: Linh Anh Moreau / SEAMEO SPAFA
Pandanus amaryllifolius	Vassana Kerdsupap / SEAMEO SPAFA
Piper betle	Benny Gratha
Piper nigrum	Benny Gratha
Sapindus rarak	Tree: Rahmadi Widodo, Dry fruits: Benny Gratha
Securidaca inappendiculata	Queen Sirikit Museum of Textiles
Sesbania grandiflora	Vassana Kerdsupap / SEAMEO SPAFA
Solanum lycopersicum	Aye Mi Sein / Department of Archaeology and National Museum, Ministry of Religious Affairs and Culture, Myanmar
Syzygium aromaticum	Benny Gratha
Tamarindus indica	Nipon Sud-Ngam / SEAMEO SPAFA
Trigonella foenum-graecum	Queen Sirikit Museum of Textiles
Vetiveria zizanioides	Allan S Alvarez / National Museum of the Philippines
Ziziphus mauritiana	Brunei Museums Department

90 year-old weaver in Mae Chaem skillfully picks threads for 'teen jok'.
(Source: Susan Stem)


SEAMEO
SPAFA
SEAMEO REGIONAL CENTRE FOR ARCHAEOLOGY AND FINE ARTS


QUEEN SIRIKIT
MUSEUM OF TEXTILES
พิพิธภัณฑ์ผ้าในสมเด็จพระนางเจ้าสิริกิติ์ พระบรมราชินีนาถ