# The Curse of Oak Island

A TV show must have some punch,
it's not enough to entertain -
It must include a healthy bunch
of mayhem, dread, and psychic pain.

Now buried treasure, booby traps
and all that gory pirate stuff -
Old tales of lights at night perhaps
you'd think that surely'd be enough.

But even tales of buried gold
on picturesque and salty isles -
Are not enough, it seems, when told
to coax TV producers' smiles.

So straightaway the call goes out
"We need a murder -- maybe worse -
To give a bit of ratings clout!"
and someone says, "I know: a curse!"

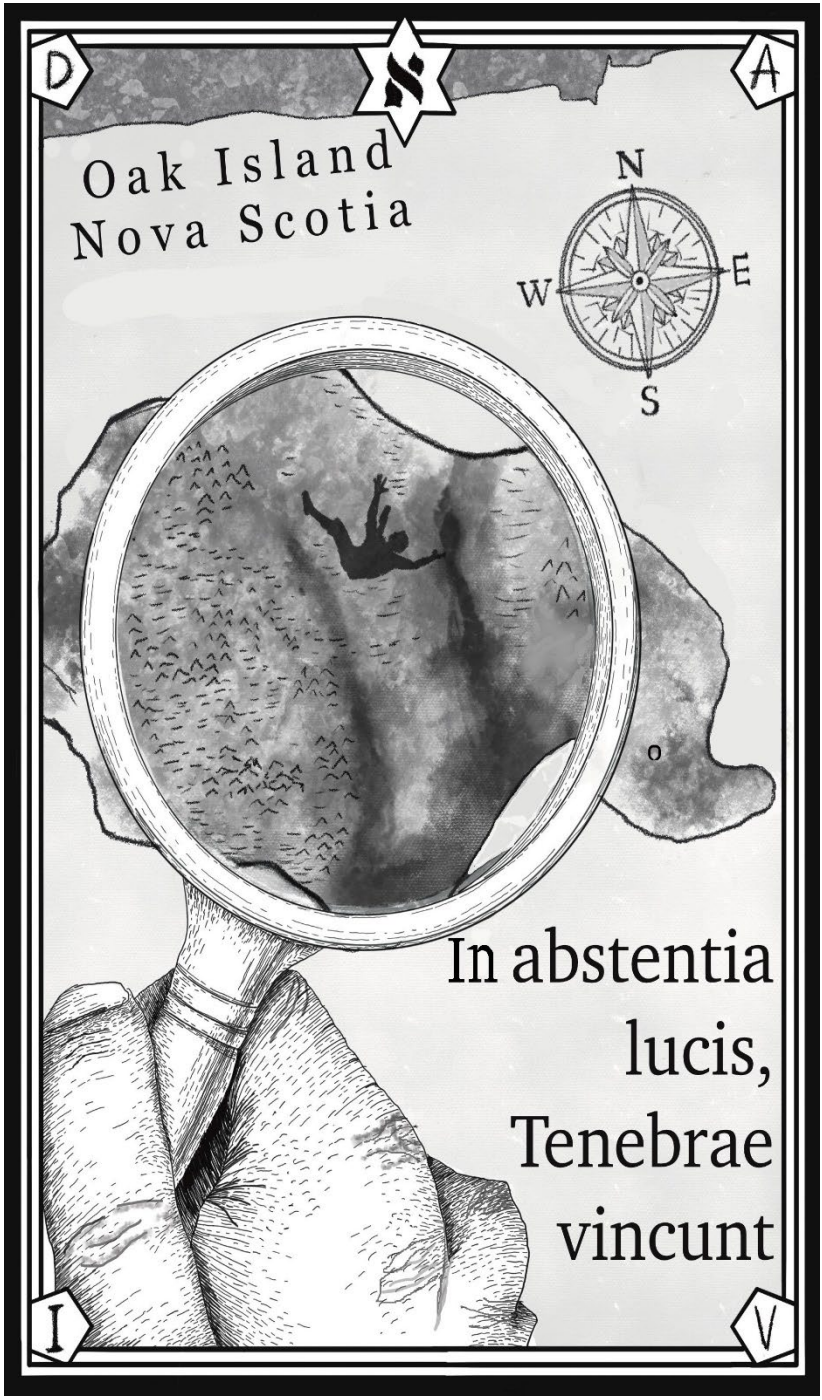
They do not search the internet
nor hunt through dusty archive shelves -
"We need a curse, a curse we'll get:
We shall just make one up, ourselves!"

And so they noted six had died
while digging for the vaunted prize -
"It won't be found," they glibly lied,
"Until a luckless seventh dies!"

And that was that, no other word
of provenance or any source -
To back an idea so absurd
now let the series run its course.

And to this day the acorns buy
(And fill the History Channel's cup
With cable ratings to the sky) -
A curse some TV guys made up.

*Joe Urbanski*


D
A
Oak Island
Nova Scotia
N
W
E
S
In abstentia
lucis,
Tenebrae
vincunt
I
V

## Chapter One
# CLUES TO MY CURSE

Let it be known to you the reader, 'curse(d)' can be a transitive verb as well as a noun. The curse as a statement, such as, '*Seven Must Die before the Treasure is Revealed*,' is a sinister warning of dread, should you venture forth. On the other hand, it can be a "curse" when one is inflicted with such an addiction or unrelenting drive responding to a quest!

Due to the untimely discovery of information which has changed the direction of this book at its late pre-production stage, the original chapter explaining the source and genesis of the Oak Island Curse has been relocated to Chapter 11, "*Curses of Oak Island*."

Here however, this author continues to pester about a festering fanaticism with fiber - as though cursed by the topic.

In May of 2023, I was presented with evidence found in Jacob Roberts' book "*The Holy Trinity Decryption, The Hidden Autobiography of Sir Francis Bacon*."[1] This information immediately stopped Volume III book production. This material is further explained in Chapter 4, "*Serving up Some Bacon*," later in this book. Completely unrelated and without earnest, I read an article celebrating the anniversary of the successful germination of a plant from 2000 year old seeds; which were found in the mountaintop fortress of King Herod, called Masada.[2] This happened to be where my son performed his Bar Mitzvah a dozen years earlier, so it sparked my interest. Together, these two new sources of information demanded a review of the historical documents and commentary surrounding the identification of the Oak Island mystery plant fiber. Here is a quick review.

# Fiber Findings Again

The mysterious Oak Island fiber was first found by searchers seeking pirate treasure, in 1804. They came across a thick layer of it on the sixth oak-log platform, some 60 ft down, in what was to become known as the 'Money Pit.'[3] In 1850, when frustrated searchers sought sourcing of water flooding their excavations, they dug up what appeared to be a manmade filtration system underneath the beach sands of Smith's Cove.[4] All told, the fiber in these two locations alone, was voluminous and calculated to weigh more than 1.54 metric tons.[5]

The actual miners doing the searching, thought the fiber, described with a rind or husk, appeared to be from the coconut.[6] Yet the officials thought the fiber to be "a vegetable growth from Japan or Mexico," – *zoysia grass*.[7] By 1895, the marketing for investing in searcher activities on the island, claimed the fiber was "East India grass."[8] Finally, in 1937, Harvard Botanical Museum untangled the falsehoods about the fiber and firmly announced it was "readily distinguishable as Manila hemp" – *Abaca* (*Musa textilis*)."[9]

Perhaps not to be *out-determined*, in 1965, the Department of Obstetrics and Gynecology at the Albany Medical College of New York, combed through this mystery fiber and declared…

> *"…after spending considerable time in the examination of this hair sample,* [we] *have found no evidence that would permit the scientific conclusion that it is human hair. It is an animal hair of unidentifiable origin."*[10]

Of course they did!

Next, in 1970, the National Research Council of Canada determined three of the four submitted samples, were indeed "coconut fiber."[11] Again, in 1976, Searcher Robert R. Dunfield responded to author D`Arcy O`Connor's inquiry about the fiber sample he submitted to the University of Southern California (USC), in 1966. His quoted response was…

*"Yes. The coconut fiber was analyzed to be coir, a fibrous mass between the coconut shell and the outer husk, which was used as dunnage in the early days of primitive shipping."*[12]

Was the second half of that comment Mr. Dunfield's erroneous assumption, or was that part of USC's academic determination?

Meanwhile, back on Oak Island, searchers continued to dig up clumps of "mystery fiber" here and there, as they excavated and uncovered numerous underground manmade constructs. It became so commonplace in and around Smith's Cove, Dan Blankenship, the Restall's and Dan Henske could take you to where it could be dug up without much searching. And in 2013, Dan Henske did just that for the Laginas.

1980. Isaac's Point - Background and Smith's Cove - foreground, at low tide.

BETA Analytic Labs has provided radiocarbon testing for island searchers, since 1990. They determined the radiocarbon tested age of most artifacts, including found samples of 'coconut fiber'. They were not a lab capable of identifying the fiber by species, genus or tribe. By then, it was commonly assumed this mystery fiber to be coconut coir fiber from the husk of the coconut palm (*Cocos nucifera*).

Finally, The Woods Hole Oceanographic Institute (WHOI) issued a Draft Report in 1996, titled, "*Oak Island Hydrogeology, Hydrography and Nearshore Morphology, July-August 1995 Field Observations*."[13] By all accounts, this became the "smoking gun" regarding the true, factual identification of the mystery fibers frequently found on Oak Island. With the latest in scientific technology and laboratory staff, and additional professional palm expert input, WHOI could not conclusively determine the identification of the two fiber samples from Oak Island.

Though they radiocarbon/AMS test dated two submitted samples (AD 855, #10167, and AD 1185, #10168*), the best they could muster as to plant fiber determination was – *palm fiber*.

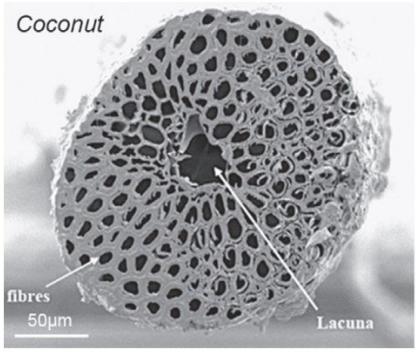
*WHOI rejected this sample as most likely a subset of a previous BETA Analytics' tested sample, which appeared to have a $^{14}C$ tested date of AD 1180.

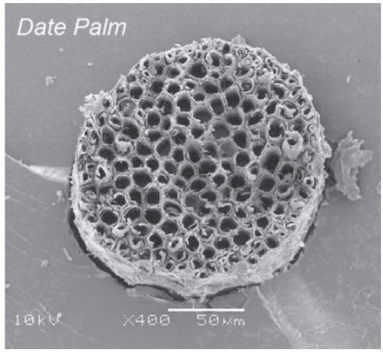
## *Forensic Fiber Comparison*

This review has prompted new research and examination between the physiochemical, microcellular, mechanical, and ethnobotanical history of coconut palm fiber with that of date palm fiber.

Retted coconut coir fiber from the Husk surrounding the seed (nut) of (*Cocos nucifera*)

Retted date palm fiber from the Mesh/sheath of the date palm trunk of (*Phoenix dactylifera*)

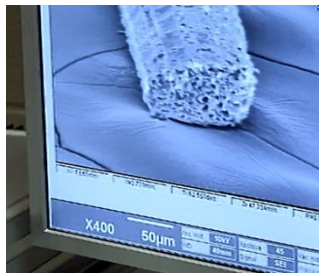


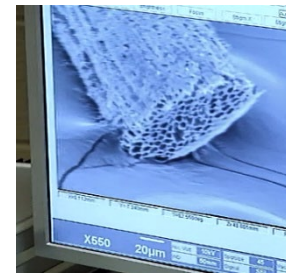

Scanning Electron Microscope (SEM) image of cross sectional shape of coconut coir fiber and date palm coir fiber. All images courtesy: Dr. Mohamad Midani*, Faculty of Engineering and Materials Science, German University in Cairo, Egypt.

Most recently, on the History Channel Cable TV series, *Curse of Oak Island*, season 01/episode 02, titled "The Mystery of Smith's Cove," we witnessed newly found 'coconut fiber' dug up at Smith's Cove on Oak Island, and taken to Acadia University in Nova Scotia, for species identification. Acadia University Biologist and Director of their E.C. Smith Herbarium, Dr. Roger Evans, performed species determination using SEM imagery, of both the newly found fiber (labeled "*New Sample*") given to him from Smith's Cove, as well as comparing it with a fiber sample (labeled "*Test Sample*"); also given to him by searchers from the island. This second sample was said to be 'known' as coconut fiber and to use as a default example of *Cocos nucifera fiber*, for comparison analysis. Presumably, this *Test Sample* had also been found on Oak Island and was previously laboratory-certified as coconut fiber. Here are screenshot images from that *Curse of Oak Island* episode. The first two are the individual SEM images generated by Dr. Evans and the third is a side-by-side, or split-screen presentation of the same images, aligned to make a clearer and diagnostic comparison.

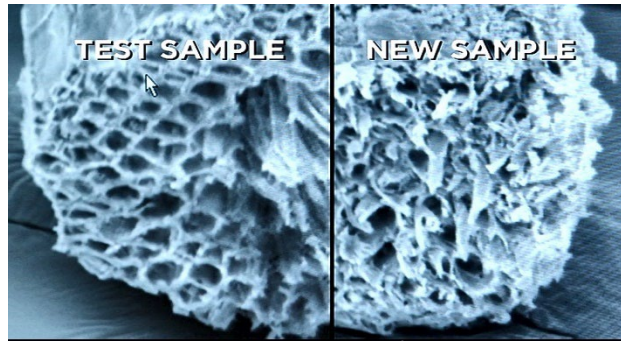
SEM Image 1. *New Sample*




SEM Image2. *Test Sample*




SEM Image 3. Split-screen Comparison of Fiber Images by Dr. Evans



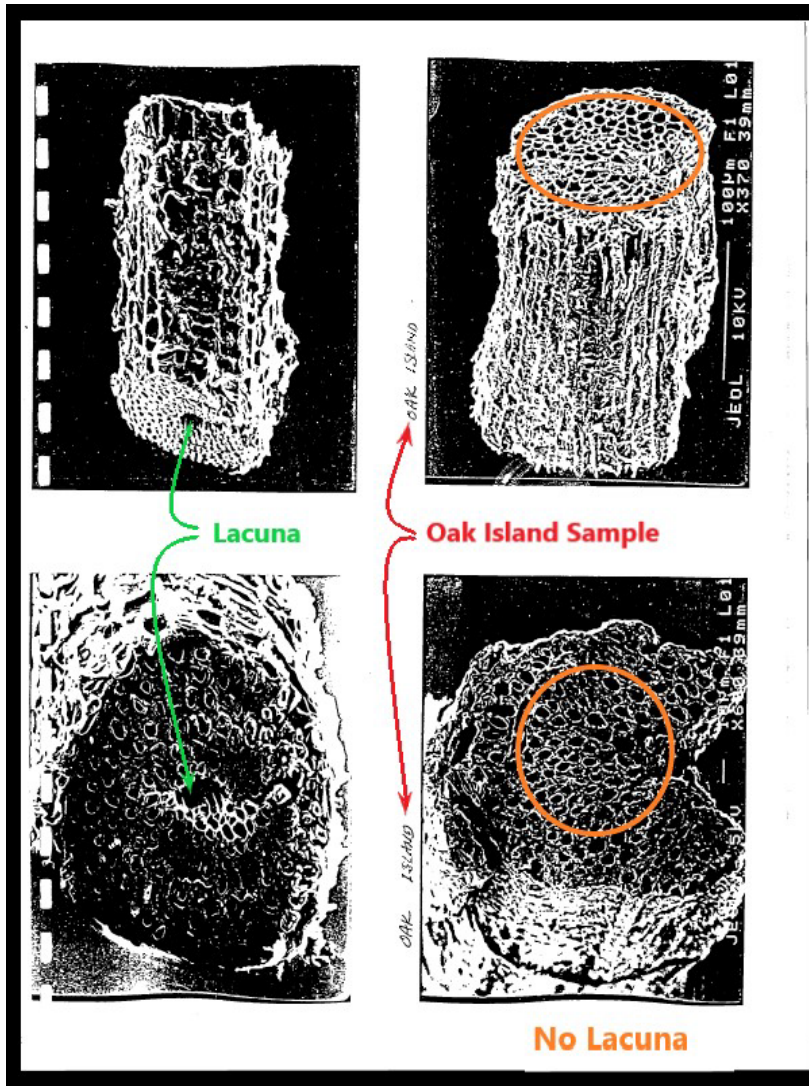
None of these SEM images of *New Sample* or *Test Sample* display the unique *Cocos nucifera* fiber microstructure, known as a "Lacuna."[14, 15] This Lacuna – 'center hole' or 'hollow,' is clearly seen in the SEM imagery on the previous page for the coconut fiber, which makes it buoyant. Does this indicate these SEM images created by Dr. Evans are not of fiber from the *Cocos nucifera*? Not coconut fiber at all? Yes it does.

If the *Test Sample* is not from *Cocos nucifera*, but was misidentified as such, then the *New Sample*, which came from the same source as the *Test Sample* (Smith's Cove), will of course match in a comparison test. All that SEM imagery analysis has proven then, is that both "samples" are forensically proven to be the same fiber. And because neither SEM image of either sample show a Lacuna in the center of the microfibril, then we know neither image was from the species *Cocos nucifera*!

Again, In 1995, WHOI performed SEM imagery comparison analysis on a *New Sample* (labeled Oak Island) received from island searchers. They acquired a *Test Sample* of *Cocos nucifera* fiber for comparison. WHOI stated in their Draft Report,

> *"For Comparison, we have taken SEM micrographs of the coconut fibre at Oak Island, as well as mesocarp coconut fibre from Cocos nucifera, a coconut commonly found in the tropics (fig. 11). Though notable similarities exist between the two types of fibres, we await final confirmation from the palm and coconut specialists. Page 40."*[16]

The SEM micrograph images within their report (next page), provide two views of high magnification of fiber for comparison. On the left side of the graphic in WHOIs Draft Report, pg. 40, you see fiber of the proven *Cocos nucifera*, showing a Lacuna. Yet the images on the right side, we do not see a Lacuna in either sample marked 'Oak Island.' Neither the palm expert nor the coconut expert who reviewed these SEM images made a conclusive determination as to the identity of the *Oak Island sample* fiber. Though we clearly see there was no Lacuna in the *Oak Island sample*, the lack of a Lacuna does not necessarily help the experts identify from which of the 2600 species of palm plants, the images did belong. Coupled with the fibers degradation, the best the experts could determine was that it was – *palm fiber*.




My comments are noted in color. See: WHOI

For more SEM images of *Cocos nucifera* Lacunas, see glossary.

But if not coconut fiber, then why is our research presenting the Oak Island mystery fiber to be *date palm fiber*, and not fiber from another palm tree? Good question. Several of the archaeobotanists who responded to our worldwide inquiry have made similar inquiries.

# Further Fiber Finds

Anthropologist and expert in Biology/Terrestrial Ecology, Dr. Vincent Battesti* who specializes in ethnoecology, and studies date palms at the Siwa Oasis in Egypt (www.vbat.org); questioned me regarding the few bits of information I provided him of what my research was currently involved with. He said, *"I really don't understand how you so easily jump from your timeline (12-14th c.) to antiquity and Jericho? The old world is full of date palms*."[17]

Dr. Dennis Johnson*, Biogeographer and author of "*Date Palm (Phoenix dactylifera) Dispersal to the Americas: Historical Evidence of the Spanish Introduction*," also thought of other palm choices I may need to seriously study to solve this inquiry. And, he provided options he felt may need investigation beyond just the date palm. He wrote,

> *"I have of course heard of Oak Island, but never read any substantive about it. I must compliment you on your research into the fiber in question. As far as I can tell, you didn't miss anything in terms of references. And you contacted palm specialists I know, i.e.,* [Scott] *Zona*, the late* [Natalie] *Uhl* and* [Francisco] *Guanchez*. Without any preconceptions, my first thought about the fiber went to shipbuilding and caulking. Mention of a European source made me think of "crin vegetal," an anciently used fiber in the Mediterranean Region, derived from the European Fan Palm (Chamaerops humilis), which occurs north and south of the Med. I would think any palm leaf-base fibers could be used much in the way coconut coir is. Crin vegetal's major historical use was in cushion stuffing, probably mattresses too. The fact that crin vegetal was available in the Mediterranean would suggest it being more easily obtained and shipped to Oak Island than* [coconut] *coir from Kerala* [India]. *Best of luck with your quest."*[18]

*Crin vegetal?*
*European Fan Palm –*
*Mediterranean Dwarf Palm -*
*(Chamaerops humilis)?*

The definition of *crin vegetal* is translated as follows:

*"(Botany)* Name given to the fibers of various plants because of their resemblance to horsehair: *agave, eelgrass, tillandsia, dwarf palm*, etc. This plant hair *was first made in Algeria, where it is still made; but it is especially in France that more development has been given to this manufacturing, by* Image, *means of whole loads of dwarf palm leaves, [...].—*

Courtesy: www.43-west.com/fournitures-Ameublement-confection/crin/crin-vegetal/

(*Scenario of French establishments in Algeria, 1854/1855 , Ed. Imperial Printing Co., 1857)*[19]

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## *Picking Potential Palms*

So, as Dr. Vincent Battesti argues, "*Why jump around from antiquity to the crusader period of the 1100's thru 1400's? Aren't there other date palms in the world?*" And to Dr. Dennis Johnson's comment, if shipbuilding is the issue, *"Why this palm tree and no other palms which produce similar fiber?*"

My initial communications with both scientists were emails including brief summaries of what was being researched and where that evidence seemed to be taking the investigation. The letter to them included links to the repository website where our survey titled, "*Oak Island Mystery Fibers*," could be read and reviewed. Their comments are perfectly understandable based on what subset of data I presented them at the time. Yet both scientists implied the approach taken in this investigation, may be lacking a more proper scientific method modality. And, they would be correct, because for this type of investigation required the use of the "*Forensic Scientific Method*," not the scientific method they were perhaps thinking of.

> *"The scientific method, a time-honored approach for discovering and testing scientific truth, does not and cannot work for the forensic sciences in its standard form because it does not work for past events. Past events cannot be* ***observed****,*

> *cannot be **predicted or deduced** from physical evidence, and **cannot be tested** experimentally. The forensic scientific method is a modified form of the scientific method that compares evidence obtained by investigators with observable physical findings discovered at the crime scene* [Oak Island]*, in the laboratory, or in the autopsy suite* [reputable publications]*. This comparison verifies if witnesses or suspects* [historic records] *are telling the truth about what they witnessed* [scientific fact-based evidence]. *The method is a powerful technique for determining the truth of past events."*[20]

For a full explanation as to what the forensic scientific method modality of investigation is, the evidence as it applies to Oak Island and the processes of validation, please see Appendix A, "*Forensic Scientific Method Applied*."

To further address those two interrogations, our examination included research of evidence gleaned from Oak Island, thru archaeobotanical and paleoethnobotanical record. This research regimen would use a different approach with a new perspective.

> *'Archaeobotany' focuses on recovery and botanical identifications; whereas 'paleoethnobotany' focuses on the archaeological interpretation of the relationship between people and plants."*[21]

Archaeobotany includes palynological analyses, seeds/fruits analysis, wood analysis, phytolith analysis, diatom analysis, etc. The various archaeobotanical investigations use different tools, sampling strategies, laboratory techniques and procedures, and data processing. The utility of archaeobotany is not limited for studying ancient times (e.g., prehistoric - paleoarchaeology), but whenever and wherever plant remains are the principal sources for studying past environments. Together with the plants which were voluntarily introduced by humans in a territory, many alien plants were involuntarily or accidentally introduced. Thus, archaeobotanical investigations are proved to be a useful tool for the reconstruction of ancient landscapes and for interpreting the current situation.[99]

We had completed our examination of the coconut coir fiber as it may pertain to Oak Island, as future sections and chapters of this book will elucidate. Now we will apply a forensic scientific method to examine, eliminate and elevate the palm credited with producing the fiber found on Oak Island. Following this modality, the analysis uses: event timelines, dynamic social constructs, evidentiary analysis by a wide variety of specialists and experts, as well as publicly available published research on various related topics, including study of the ethnobotanical history of that period.

Although there are over 2600 species of palm in the world, this forensic examination does not need to botanically review but two of them, the coconut palm (*Cocos nucifera*) and the date palm (*Phoenix dactylifera*). The reasons will become clear as we discuss both plants throughout the book and apply forensic scientific methods.

**NOTE:** As stated in this Volume's Introduction, we are identifying those science experts who have responded to our survey or who have communicated with our research efforts. When their name appears within this book, and in the Chapter Endnotes, a (*) will be marked. We thank them.

On the Left –

**Coconut Palm**
Tall, nui kafa
*(Cocos nucifera)*

On the Right –

**Date Palm**
Cultivate Female
(Phoenix dactylifera)

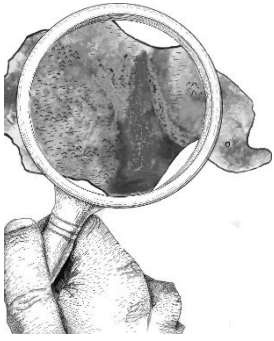
Images courtesy:
IStock.com

Here, and in Chapters *2* & *3,* this book will tidy up research on the coconut palm, while Chapters *1 & 4* do due diligence on the date palm. Chapters *5*, *6 & 7* further our knowledge on how these palm fibers impact the Oak Island Treasure saga and explain their utility and function as they were found in the manmade constructs. As for presenting all the evidence, we have several appendices which serve better than chapters can in a book this size. Appendix A, "*The Forensic Scientific Method,*" fully tracts how determinations were made so viewers can conclude or counter our findings. Appendix B, "*Date Palm Deity*," tries to summarize the voluminous history of how the date palm was venerated, worshipped and idealized.

In the next section we will explore why date palm fiber from *Phoenix dactylifera* is biologically a match to the fiber found within the island, and how the attributes of this plant guide us to further explore other scientific approaches to make final determinations isolating this fiber.

In the end, the fiber itself will only tell us what it is. The forensic analysis outside the microscope will tell us the remainder of the story.

The question now being answered within this book… *Is the plant fiber found on Oak Island and radiocarbon tested to a window of* AD 1185-1330*, from the coconut palm tree (Cocos nucifera), or fiber from the date palm tree (Phoenix dactylifera)… and what does it tell us of the Oak Island Treasure Saga?*



***Eeny, Meeny.***

***Miny, Moe…***

Courtesy:
https://en.wikipedia.org/wiki/Eeny,_meeny,_miny,_moe

# Deciding Drupes of Difference

This section introduces the Date Palm Tree (*Phoenix dactylifera*) and compares it to the Coconut Palm Tree (*Cocos nucifera*). The similarities of characteristics shown will help to isolate palm species and help explain their functional impact regarding the Oak Island Treasure saga. Briefly, we will describe the date palm .

The date palm tree is a *diploid* [complete set of chromosomes],[22] *perennial* [lives more than two years], *dioecious* [male or female, not both],[23] and now a member of the Arecaceae family of *monocotyledonous* [flowering angiosperm][24] plants, adapted to arid environments. There are about 200 genera and more than 2600 species of this family of plants.[25] '*Phoenix*' is one of the genera with approximately 14 species, which are native to the tropical or subtropical regions of southern Asia or Africa, including the *Phoenix dactylifera* (Siddiq et al., 2013; Eoin, 2016).[26] The date palm (*P. dactylifera*) is one of the main elements of flora in the Middle East and North Africa.[27] Its distribution stretches from Mauritania in West Africa [north of Senegal] to the Indus Valley [Afghanistan, Pakistan, NW India] in the east. Archaeobotanical records suggest that the earliest consumption of fruit (dates) from the date palm is from the Arabian Neolithic period, 7000 **y**ears **b**efore the **p**resent (ybp).[28] Dates are one of the oldest known fruit crops and have been cultivated in North Africa and the Middle East for at least 5000 years (Zohary and Hopf, 2000).[29] Today, date palm trees grow in Australia, Mexico, South America, southern Africa, and the United States, especially in southern California, Arizona, and Texas (Chao and Krueger, 2007; Al-Harrasi et al., 2014; Hazzouri et al., 2015).[30]

Date palms can grow within average temperatures of 55 to 82°F, withstanding up to 122°F and sustaining short periods of frost at temperatures as low as 23°F. Ideal temperature for the growth of the date palm tree, during the period from pollination to fruit ripening, ranges from 70 to 81°F average temperature. Dates are widely grown in the arid regions between Latitudes 15°N and 35°N (Zaid and de Wet, 2002).[31]

*Images of* **The Date Palm Tree** (*Phoenix dactylifera L.*)

Illustration on the left is of a cultivated female, courtesy of ***The Encyclopedia of Fruits & Nuts***, p.140, *Arecaceae.* (source: le Maout, 1877) Below, are two cultivated male plants. (source: Bergman, 1977)

Growing naturally in the wild, the date palm tree will look less like a tree and more like a coppice. With a bevy of offshoots and a thicket of stems and dead leaves, the plant and offshoots will share a singular root system.[32]

Domesticated dates are bigger than those of wild relatives and wild date palms (Barrow, 1998 Gros-Balthazard*). Date fruits do not develop without pollination, and when they do, they don't reach maturity and are not palatable (Pintaud et al.,2013).[33]

The date palm tree has unique biological and developmental characteristics that necessitate special propagation, culture, and management techniques.[34] This will become a critical aspect to understanding the historic botanical trail which eventually leads to Oak Island. The Flowers of date palm tree are small and yellow colored and attached directly to spikelets from the trunk, which develop into fruits called *date palm fruits* (El Modafar and El Boustani, 2001; Biglari et al., 2007).[35]

As mentioned, The date palm has separate male and female plants and is unique among palms in that it can reproduce from a seed (date pit), or from an offshoot; in contrast to other palms that only have one or the other as an option. The date palm's unique ability to produce offshoots means new date palm trees can be raised exclusively from offshoots of the female date palm.[36] Offshoots develop naturally from buds produced in the axils of the leaves; these are usually located near the base of the date palm, but sometimes higher up the palm trunk (Albert 1926: 33).[37] See the image above.

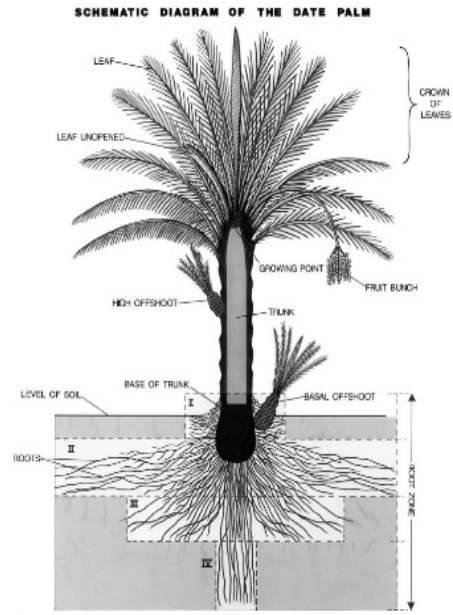
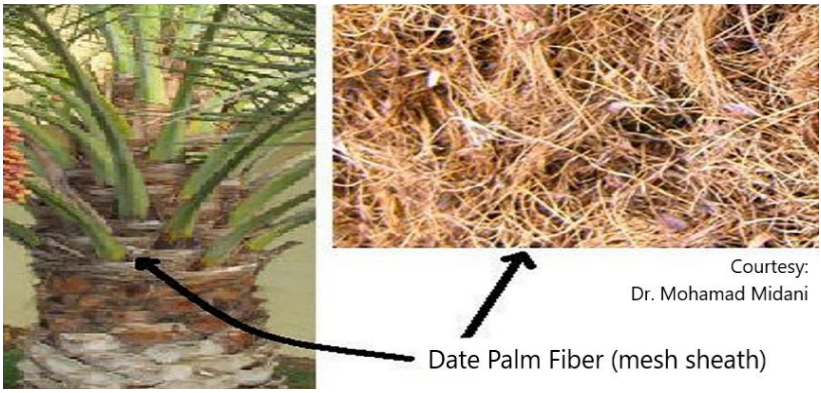


Fig. 3. Diagrammatic representation of date palm structure, showing attachment of offshoot to mother palm, among other morphological features. (USDA archival diagram)

This may be more botany than you wanted to wade into, but the propagation of the date palm becomes critical to understand why the fiber was found within manmade constructs on Oak Island.

## *Fiber Furry Date Palms*

To successfully harvest dates as a commodity, date palm requires attentive cultivation. Annual pruning of excessive or dead plant material is critical. This includes harvesting excessive off-shoots, removal of dead stems, leaves and the protective mesh/sheath fiber. This mesh/sheath fiber (also referred to as leaf/sheath fiber) grows on the trunk of the tree and between new leaves; protecting young tree growth from insects, birds, animals and extreme weather.[38] See the image below. It will be referred to as date palm fiber (DPF), and is the alternate palm fiber hypothesis, directly related to Oak Island.




As published, "*Phoenix dactylifera* height can exceed 80 feet and trees survive over a hundred years. The leaves (fronds) and mesh/sheath fiber of the date palm naturally remain intact on the tree trunk to protect it and act as a heat insulator. As seen in these various images provided by Dr. Midani, the green fronds at their base have a diamond shape. Ancient Egyptians would take these, strip the foliage and use the remaining leaf rib, to document events and dates. These would become known as *renpets* (also a deity of the same name). This Bark pattern would become synonymous in antiquity with the stylized symbology of the date palms divination and seen frequently in motifs found in temple buildings.

It is only at the top of the trunk where a date palm grows, except for possible development of the palmette clones, or offshoots, which most often occur at the base of the tree. To those Egyptians, the bark of the date palm was formed in the seasonal growing period, so one could tell by the bark patterns, how long the tree had been alive. This is one reason why the actual renpet as well as the deity, is associated with keeping dates, records and chronologies.

The next image provides a close up of a palms trunk where the fronds are growing. Between them and where the cutoff fronds are, you can see the fibrous leaf sheath/mesh sheath which protects the inner trunk stem from external threats, such as birds, insects, rodents and other animals. It, along with the dead, draping palm fronds when they die, help insulate the trunk and conserve water usage (Al-Yahyai & Manickavasagan 2012)."[39] This is not the case with cultivated female date palms, as their excess fiber and fronds are purposefully pruned away yearly.

Here are additional views of the fiber - on the trunk of the date palm, as it appears once retted and initially extracted off the trunk. Images: IStock.com

## *Perfected Palm Propagation*

Research Associate Norma Franklin* of the Zinman Institute of Archaeology at the University of Haifa, Israel, says "Historically, the propagation, planting and nurturing of female offshoots in a plantation, ensured only growing *female date-bearing palms* with genetic attributes of a productive female palm, could be preserved and replicated indefinitely (Chao and Kruger 2007: 1079). Thus, just one female date-producing palm, with good date-bearing qualities, could be farmed very quickly for its offshoots, so that same date palm could become 50 identical palms, as each new palm is a clone of the original. Only a single male date palm is needed to pollinate over fifty female date palms (Nixon 1951: 291). "Tall, single trunk female date palms are indicative of cultivated plants and are not a natural form for this tree."[40] This type of "clonal propagation" is known as **phoeniciculture**.

Archaeobotanists Dr. Muriel Gros-Balthazard* and Dr. Jonathan M. Flowers, explain that… "*phoeniciculture involves mostly clonal propagation, and rarely the planting of seeds. Historically, in palm plantations, date palms with high quality fruits are multiplied through vegetative propagation. Nevertheless, although such clonally propagated types are formally referred to as 'cultivars' (informally as 'varieties'), the nomenclature is frequently more complex in oasis 'agrosystems' where there are three categories of named types…* (Battesti*, 2013; Battesti* et al., 2018; Gros-Balthazard* et al., 2020):"[41]

- "The true-to-type cultivars are names referring to palms that are indeed exclusively propagated through offshoots. Thus, they have the same morphology, produce the same quality dates, and have the same combination of alleles, except in case of somatic mutations."

- "Ethnovarieties are groups of palms displaying the "same form" and the "same" dates according to farmers, but they group individuals having different combination of genes, because they are not exclusively clonally propagated. Although it's a very rare event, a seedling (from sexual reproduction) can be incorporated to the named type causing this lack of homogeneous genetic makeup among the individuals of a same named type, because, from a local perspective, it is the very same variety, the same "form."

- "Local categories are groups of palms having a heterogeneous combination of genes and also heterogeneous morphologies but given a common name due to a shared characteristic. Palms that have arisen from seed are a local category, and the name depends on the locality."

With a long history of cultivation and utilization by man, almost every part of the date palm was used for some purpose (Barreveld, 1993; Dowson and Aten, 1962; Nixon, 1951).[42] The take away from knowing about date palm propagation is to understand the historical involvement man was to successfully creating a critical commodity, in such desolate regions. This eventually segregates the Judean Date Palm tree specifically, as the lauded source for fruit and fiber for those ancient voyagers. Additionally, this understanding helps us comprehend the reverence and later, divination, with which the date palm evolves throughout the civilizations from within the Fertile Crescent. See Appendix B.

This is a poignant time to point out how the *Forensic Scientific Method* deviation and its applicability to past events, does much of the winnowing of palm species for us. The history has in fact pointed us to the set of evidentiary determinations which make this clear. But before we abandon botany for history, the following table illustrates aspects of the plants/fibers which will become important later.

**Coconut Palm Coir Fiber(CCF)** versus **Date Palm Coir Fiber (DPF)**

| Coconut Palm Tree | Date Palm Tree |
|---|---|
| **Native Geographic Range** | |
| Malay-Indonesian Region, Southwest Asia, India, Indian Ocean Basin[43] | SE Asia, North Africa[44] (Iraq, Saudi Arabia, India, Ethiopia, Eritrea, Egypt, Jordan, Persian Gulf, Israel, Yemen)[45] |
| **Determined Source Distance to Nova Scotia** | |
| 16,800 miles[46] | 5,500 miles[46] |
| **Latitude Range for Seed/Fruit Germination** | |
| 20° N - 20° S[47] | 15° N 35° N[48] |
| **Tree Height & Average Mortality** | |
| 30m, >100 years[48] | 28m, >150 years[48] |
| **Cultivated Tree Annual Fruit Production** | |
| 80 - 100 Nuts[47] | 1,000 - 1,500 ea. 40kg of Dates[48] |
| **Tree Sexuality** | |
| Monoecious[48] | Dioecious[48] |

Continued…

| Coconut Palm Tree | Date Palm Tree |
|---|---|
| **Physical Location of Tree Fiber & Various Names** | |
| A natural seed-hair fiber obtained from the outer shell (endocarp), or husk, of the nut (seed) of the coconut palm. Known as "coir" derived from "*Kair*"– Malayalam, an Indian language (Tamil, "*kayiru*") meaning cord. The Portuguese used the variation "Cairo or cayro" (Yule, 1903).[49] | Date palm "leaf sheath" fiber (also known as mesh/sheath fiber) comes in the form of tissue covering and protecting new date palm leaf growth. After growth, these tissues remain attached to the trunk of the palm. The tissue turns into a brownish, coarsely woven fabric or mesh. As on the trunk, the mesh/sheath fiber is used to protect newly planted offshoots from insects, birds, rodents, animals and extreme heat.[50] |
| **Frequency for Fiber Harvesting** | |
| Annual[51] | Annual[52, 53] |
| **Duration / Complexity of Fiber Retting Process** | |
| Intense lengthy chemical soak to remove impurities, 6 - 12 months[51] | Minor soaking in water to remove impurities, 2 weeks[54] |
| **Historical Value of Retted Fiber** | |
| Manufactured commodity | Annually pruned waste material |
| **Fiber Weight (per tree, per year)** | |
| 9Kg (100 husks per tree), (per tree = 300 Oz[55] | 1.56kg[54], 1.25kg[53], 1.25kg[56] (mesh per tree = 44.1 Oz) |
| **Fiber Used for Maritime Applications** | |
| Ropes, cordage, rigging, twine, cables, mats, nets, caulking, bedding, stitching boats, belts, bags, sacks, containers | Ropes, cordage, twine, cables, mats, caulking, bedding, stitching boats, belts, bags, sacks, containers |
| **Other Commodities from Trees' Fruit** | |
| Alcohol, beer, candles, cement, meat, oil, curd, cheese, cosmetics, fuel, medicine, glycerin, explosives, ghee, honey, juice, soap, curd, jaggery, salad, sugar, water, curd, lubricant, milk, molasses, vinegar[51] | Alcohol, animal feed, beer, candle wicks, flour, oil, honey, meat, paste, pickles, cake, salad, sugar, soap, wine[48] |
| **Edible Shelf-Life of Boxed Fruit** | |
| Husked nut = 3 - 5 months. Dehusked nut @ >61°F = 2 - 4 weeks Dehusked nut in dry/heat = 5 days[48] | Stored in cool, dry, dark area, dates will last 1-3 months. Dates called Soft rot first, Semi-dry next, dry rot last.[61] |
| **Flammability of Retted Fibers** | |
| Coir fiber = Class 4.2 (liable spontaneous combustion **when wetted**) by IMDG Code[57] | Palm fiber = Class 4.1 (liable spontaneous combustion **when exposed to heat/flame**) by IMDG Code[78] |

Continued...

| Coconut Palm Tree | | Date Palm Tree |
|---|---|---|
| **Trees Needed to Source Oak Island Fiber Cache (1,538,434.1g)[46]** | | |
| 181-362 Coconut Palm Trees[46] | | 1,231 Date Palm Trees[46] |
| **Preferred Climate Conditions** | | |
| Warm to hot, high humidity.[48] Littoral areas of Tropics | | Warm to hot, no humidity.[48] Aridity Evapotranspiration Index 0.03 - 0.5[59] |
| **Moth and Rot Resistance of Retted Fibers** | | |
| Yes[49] | | |
| **Bacterial Resistance of Retted Fibers** | | |
| Yes[49] | | |
| **Chemical and Microbial Resistance of Retted Fibers** | | |
| Most resistant of plant fibers[49] | | |
| **Saltwater Resistance of Retted Fibers** | | |
| Highly resistant[49] | | Highly resistant[48] |
| **Freshwater Resistance of Retted Fibers** | | |
| Yes[49] | | Yes[49b] |
| **Maximum Length of Retted Fibers** | | |
| 35cm[49], 50 - 300mm[54] | | 50 - 300 mm[54] |
| **Maximum Dimensions of Retted Fibers** | | |
| 25 – 50[51], 27.94[49] | Fineness | 30.8%[52] (length) |
| 100 – 450[49, 54] (µm) | Diameter | 100 – 2000[54], <700[53] (µm) |
| 0.9[54], 1.3[53] (gm/cm$^3$) | Density | 0.917[54], .6 - .7[53] (gm/cm$^3$) |
| 0.047[52] (W/m k) | Thermal Conductivity | 0.083[52] (W/m k) |
| **Maximum Strength of Retted Fibers** | | |
| 10.0 - 15.0[51, 49] (g/Tex) | Single Fiber Tenacity | 13.9[60] (g/Tex) |
| 10.0 - 15.0[51, 49] (g/Tex) | Bundle Tenacity | 1.8[60] (g/Tex) |
| 39.5%[54] | Crystallinity (CI%) | 38.5%[54] |
| 131 – 175[49], 216[54] | Tensile Strength (MPa) | 226.24[54], 97 – 165[60] |
| **Initial Elastic Modulus of Retted Fibers (*retted in water)** | | |
| 4 – 6[60], 4.6 - 9 (GPa)[54] | | 5 – 12[54], 1.91 - 11.32 (GPa)[53]* |
| **Maximum Elongation of Retted Fibers** | | |
| 15 - 40% at break point. High elongation properties, stretch beyond elastic limit without rupturing, can take up permanent stretch[49, 55] | | 5 - 10% at break point. ¼ the failure strain of coconut coir fiber.[54] |
| **Microcellular Structure Features of Fiber (SEM)** | | |
| Circular with cellular structure made up of hollow fibrils bonded together by a primary layer. In center of fiber is a large lumen known as a Lacuna.[54] | | Circular with cellular structure made up of hollow fibrils bonded together by a primary layer. **A Lacuna is not observed in date palm coir.**[54] |

Continued...

| Coconut Palm Tree | | Date Palm Tree |
|---|---|---|
| **Maximum Retention/Memory of Retted Fibers** | | |
| High[49] | | |
| **Maximum Swelling of Retted Fibers** | | |
| 6 - 8.5%[49] | | |
| **Water Retention/Absorption Value of Retted Fibers** | | |
| 8 - 12.5%[51], High[49] | | 6.2%[52] |
| **Water Weight Absorption by Weight of Retted Fibers** | | |
| | | |
| **Mechanical Wear Resistance** | | |
| High ductility & toughness and the ability to deform plastically.[49, 54] | | |
| **Chemical Make-up (wt.%) of Retted Fibers** | | |
| 35.25 - 45.84%[54] | Lignin | 24 - 39.86%[54] |
| 36 - 43%[49], *41.1 - 43.4%*[54] | Cellulose | 43. - 50.6%[54] |
| .15 - 25%[51, 49] | Hemicellulose | 8 - 19%[53] |
| | Cellulosan | |
| 3.3 - 4.0%[51], 3%[54] | Pectin | n/a[54] |
| 5.25%[51], 8%[49] | Water/Moisture | 5.08%[52] |
| 2.2%[51] | Ash | 5.96%[52] |
| **Chemical Decomposition of Retted Fiber (per TGA)** (Thermal Gravimetric Analysis) | | |
| >392°F[54] | Initial Loss (Water Vapor) | >392°F[60] |
| 437 - 572°F[54] | 1st Stage (hemicellulose) | 437 - 572°F[54, 53] |
| 572 - 662°F[54] | 2nd Stage (Cellulose) | 572 - 662°F[54, 53] |
| + 662°F[54] | 3rd Stage (Lignin) | + 662°F[54, 53] |
| **Biodegradability / Situational Decomposition (in time)** | | |
| 3 - 4 years[47] | Untreated Fiber (Unprotected environment) | |
| | Treated Fiber (Unprotected environment) | |
| | Treated Fiber (Anoxic, anaerobic, saline) | |
| Low Rate[45], **Highest**[45] | Biodegradability / **Durability** | |

***"In conclusion, date palm coir fiber and its composites have very similar characteristics to coconut coir fiber" –***

M. Midani*, L. Elseify*, T. Hamouda, A. Hassanin.

Where would you like your diploma in Plant Biology mailed to?

The intersection of forensic facts, such as: The radiocarbon dating of Oak Island fiber; The islands' megalithic boulder construction; The partial scientific identification of those island fibers; The volume of fiber found; and Identification of ancient voyagers who had the money, means and mission; and more… has driven the examination to a specific region of the world. Unlike coconut coir fiber, the date palm fiber analysis was surprisingly focused and fruitful.

## *Dating Divine Drupes*

Every botanist worth his weight in "date stones," believe they know where the date palm *Phoenix dactylifera,* originated. Renown botanists like Serranus, Olivier de Marseille and Johannes Eurenius argue the true source was in the land of Israel. Warburg opined the origin was more specifically along the banks of the Jordan and in the proximity of the Dead Sea.

Geographically speaking, much of our story has concentrated on the arid deserts of southern Israel. Here, 'mad' scientists recently plotted to germinate 2000 year-old ancient seeds of a long-extinct date palm variety. Their success became the resurrected phoenix of the Judean Date Palm, which historically is the famous *Phoenix dactylifera* embodied in the spirit of the Assyrian Sacred Tree.

Dr. Sarah Sallon*, Director of the Louis L. Borick Natural Medicine Research Center in Jerusalem, along with her colleagues, wrote *"Origins and Insights into the historic Judean Date Palm based on Genetic Analysis of Germinated Ancient Seeds and Morphometric Studies."*[62] This research included the sciences of genetic analysis, structure analysis, microsatellite genotyping, morphometric studies, and really good "green thumbs." Much of what this article explains is the scenario of this cultivar, between Assyrian worship of the date palm through antiquity to the crusader period. This is where Oak Island comes in. Excerpts from this publication telling the story of these seeds are on the following pages.

*"Judea, an ancient geopolitical region that arose during the 11th century BC in the southern part of the historic Land of Israel, and situated at the cross roads of Africa, Asia, and Europe. Historically, this reflects a thriving Judean date culture around Jericho, the Dead Sea, and Jordan Valley. Date palms in the southern Levant, The Kingdom of Judah (Judea), in the 11th century BC was particularly renowned for the quality and quantity of its dates. These so-called "Judean dates" grown in plantations around Jericho and the Dead Sea were recognized by classical writers for their large size, sweet taste, extended storage, and medicinal properties. Described by classical writers including Theophrastus, Herodotus, Galen, Strabo, Pliny the Elder, and Josephus, those plantations produced superior fruits which enabled them to be exported throughout the Roman Empire. Several varieties of Judean dates are also described in antiquity including the exceptionally large "Nicolai" variety measuring up to 11 cm, and date variety "Taali," cultivated in both Judea and Babylon is mentioned in the Talmud. While evidence suggests that Judean date culture continued during the Byzantine and Arab periods (4th to 11th century CE), further waves of conquest proved so destructive that by the 19th century, no traces of these historic plantations remained."*

*"In 2008, it was reported the successful germination of 1900-year-old date seeds recovered from several locations, including the historical site of Masada overlooking the Dead Sea (37 to 4 BC). Of these ancient seeds germinated they were identified by the following monikers: "Methuselah," "Adam," "Hannah" (first to fourth centuries BC). Genetic relationships between these ancient dates and current varieties show Methuselah and Adam close to eastern modern varieties Fardh4 and Khalass."*

*"The ancient seeds were of cultivated origin, most likely originating from the region's ancient date plantations. Indications are that substantial knowledge existed in ancient Judea 2000 years ago regarding the most suitable*

*males for pollination of female date palms existed. This shows phoeniciculture was alive and prospering."*

*"In Israel, the oldest remains of Phoenix dactylifera are wood specimens 19000 ybp on the Sea of Galilee. Recovery of carbonized date seeds from Chalcolithic and Early Bronze Age sites (4500 to 2900 BC) in the Judean desert, Jordan Valley, and Jericho and early Iron Age sites in Israel (12th to 11th century BC) show human exploitation and consumption of dates occurred at this time."*

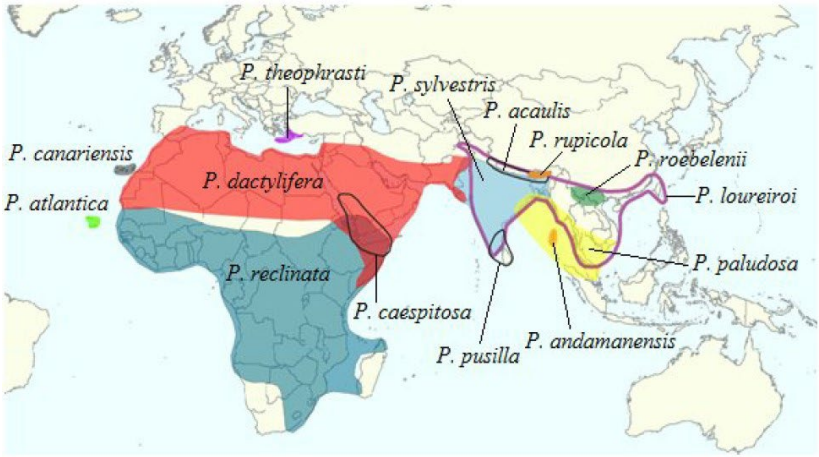
*"In this respect, Methuselah, Adam, and Hannah (first to fourth centuries BC) have a predominantly eastern genome and eastern maternal lineage. The Phoenix dactylifera cultivated by the inhabitants of Judea, have a relict population, recently found in Oman. After the collapse of the Neo-Babylonian Empire, returning exiles brought this specialized knowledge and selected cultivars back to Judea. Phoenicia, a maritime trading nation occupying the coastal areas of modern northern Israel, Lebanon, and Syria (1500 to 300 BC), was also historically associated with cultivation and trade of date palms."*

*"Although Phoenix dactylifera can live for more than 100 years and date groves in this region are thought to have persisted for several more centuries, they were already becoming rare by the 13th century. Eventually, they had been entirely replaced by seedling populations or feral, wild trees producing only low-quality fruit."*

I was able to communicate with several of the authors and participants of this project prior to outbreak of war in Israel, on October 7, 2023. Though the Arava Institute where these palms are being maintained is located on Kibbutz Ketura, located at the bottom of geographical Israel, they are isolated, approximately 175 miles southeast of the Gazan strip, which is along the Mediterranean Sea. Let us hope they are not hindered in their work.

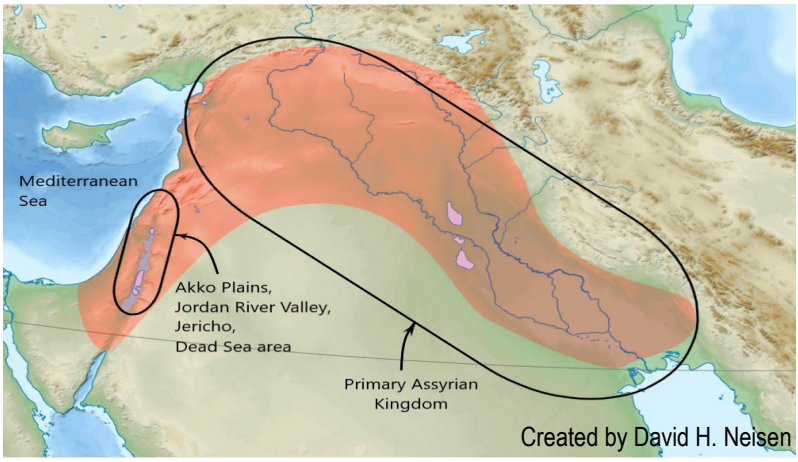
## *Finding the Phoenix Family*

The genus *Phoenix* consists of 14 species of palm in the Arecaceae family. Yet *Phoenix dactylifera* (**in red**) is grown for its fruit,[63] and is considered the one 'True Date' species.[64] Below is a map depicting their native regions. Map: **Distribution of the Phoenix Species**.




(Map by M. Gros-Balthazard based on Munier, 1973; Barrow, 1998: Henderson, 2009)

Our area of research encompasses a much smaller area of the *P. dactylifera* distribution region. The map below, helps to pinpoint the area within the Fertile Crescent in general, the Levant specifically and the areas around Jericho, Dead Sea, Jordan River Valley and plains east of Akko (acre). See Appendix B, "Date Palm Deity."



## The genus *Phoenix*: List of Species

(Johnson, 1996; From Barrow, 1998; USDA–ARS National Plant Germplasm System, 2022

| Species | Common name | Distribution | Notes |
|---|---|---|---|
| *P. acaulis* Roxb. | – | Northern India, Burma | Stemless; fruit edible; sometimes confused with *P. loureiri*; conservation status uncertain; local populations possibly threatened by development |
| *P. andamanensis* Sander & C.F. Sander ex R.H. Pearson | – | Bay of Bengal | Single trunk; semidwarf; species status somewhat questionable; rare, may be considered threatened |
| *P. atlantica* A. Chev. | – | Cape Verde Islands | Clustering; conservation status unknown |
| *P. caespitosa* Chiov. | – | Somalia, Arabian Peninsula | Stemless; fruit edible; habitat: wadis; species status somewhat questionable; restricted area, may be considered threatened |
| *P. canariensis* H. Wildpret | Canary (Island) date palm | Canary Islands | Single trunk; fruit edible; widely cultivated as ornamental; wide range of habitats within distribution; genetic erosion from hybridization threatens genetic integrity |
| *P. dactylifera* L. | Date palm | Middle East to western India, northern Africa | Habitat: wadis, oases; widely cultivated in suitable climates for fruit; many other plant parts utilized |
| *P. loureirin* Kunth | – | India, China, Indochina, Philippines | Dwarf; fruit edible; other plant parts utilized; taxonomy somewhat confused: two varieties (*loureiri*, *humilis*); development threatens local populations but overall, not threatened |
| *P. paludosa* Roxb. | – | Bay of Bengal, Indochina, Malaysia | Semidwarf; habitat: mangrove swamps and estuaries; not considered threatened as a species but specific populations might be threatened |
| *P. pusilla* Gaertn. | – | Southern India, Sri Lanka | Fruit edible; other plant parts utilized; conservation status unclear |
| *P. reclinate* Jacq. | Senegal date palm | Tropical and subtropical Africa, Madagascar, Comoro Islands | Habitat and morphology variable; fruit edible; other plant parts utilized; widely cultivated as ornamental; not considered threatened |

| Species | Common name | Distribution | Notes |
|---|---|---|---|
| *P. roebelenii* O'Brien | Pygmy date palm | Laos, Vietnam, southern China | Rheophytic; dwarf; widely cultivated as ornamental; conservation status unclear, use as ornamental may result in removal of native populations |
| *P. rupicola* T. Anderson | Cliff date palm | Northern India | Single trunk; semidwarf; fruits eaten by animals but not humans; conservation status unclear |
| *P. sylvestris* (L.) Roxb. | Indian date palm | India and Pakistan | Wide range of habitats; utilized for sugar, fruit; not threatened |
| *P. theophrasti* Greuter | Cretan date palm | Crete, Turkey | Habitat: coastal areas; species status questionable; restricted growing area, threatened by population pressure |

*The Phoenix* species are morphologically very close and sometimes hardly distinguishable. Very few characteristics separate the Date Palm *(P. dactylifera)* from the Cretan Palm *(P, theophrasti)* which is a wild date palm found in Crete and Turkey. Modern dates today are actually a hybrid of these two species of palms (Gros-Balthazard and Purugganan, 2021). This mixing probably happened in the very distant past, and modern dates still show a trace of the Cretan palm in their genome.[65]

*Phoenix dactylifera* is further identified to be the source of the "palm fiber" identified in the 1996 Woods Hole Oceanographic Institute's Draft Report, titled, "*Oak Island Hydrogeology, Hydrography and Nearshore Morphology, July-August 1995 Field Observations*,"[66] found on Oak Island, in the following chapters and specifically in Appendix B, "*Date Palm Deity*."

Though *Phoenix dactylifera* is considered the 'one true date palm' of the genus *Phoenix*; its mesh/sheaf trunk fiber may not be so unique or identifiable without detailed DNA testing. However, as shown in this volume, *P. dactylifera*, and the Judean Date Palm cultivar in specific, is forensically interpreted as the host of the fiber found on Oak island. This is further determined in the following chapters as elimination of other species and as historic review of the archaeobotanical record provides.

Each of the following chapters adds examination and insight in events and evidence which build the findings and parameters to make determinations. These are charted in Appendix A, "*Forensic Scientific Method*." Once the evidence of the published determinations are complete, the thesis explaining the logical hypothesis on why the ancient voyagers brought fiber to Oak Island, is explored and explained. Though the botany may have been boring and the archaeobotany and paleobotany ahead is consuming, by the end of the book you will see the forensic evidence which proves the very first facts found in the Oak Island Treasure saga!

***Cited References & Endnotes***


***1***. "*The Holy Trinity Decryption, The Hidden Autobiography of Sir Francis Bacon*." By Jacob Roberts, January 2020. Slewfoot Publishing.

***2***. "*The Sweet and Sticky History of the Date*." By Matti Friedman. Published online at Smithsonianmag.com. www.smithsonianmag.com/history/sweet-sticky-history-the-date-180980983/

*"…And now back to Masada, the site of King Herod's fortress and the Jewish rebels' last stand in the revolt against Rome. The site was excavated by Israeli archaeologists in the 1960s. Among striking artifacts that included biblical scrolls, jewelry, weapons, cosmetics and sandals belonging to the rebels, they found a number of seemingly inconsequential items, including date pits… Although they were 2,000 years old, she* [Sarah Sallon] *had the strange idea that she could make them grow."* And…

*"Date palms have been domesticated for so long that it's easy to forget they once grew wild. Occasionally you'll see a palm growing alone somewhere like a gleefully escaped convict, feral and unkempt, surrounded by offshoots protruding from the trunk, looking less like a tame orchard tree than like a fierce bush. These are cultivated palms gone rogue, not authentically wild trees."*

***3***. "*From our Regular Correspondent, The Liverpool Transcript, August 15, 1857, p. 2*." The term "Money Pit" was first published after this letter was submitted. It said,

*"Remark I shall make none, except that we felt gratified at having an opportunity for so thorough an examination of the scene of labor and of sunken money."*

***4***. "*The Oak Island Diggings." Published in The Liverpool Transcript, October 16, 1862. p. 3*."

*"Work was evidently done by hands in both pits, and also at the beach, where we found flag stones made in the form of drains and covered with a kind of grass, not the growth of this country, and the outer rind of the coconut."*

***5***. "*Oak Island Mystery Trees and other Forensic Answers*." By David H. Neisen, Christopher L Boze, and Robert W. Cook, 2022. Chapter 10, Cracking the Nut, Page 304

***6***. "*Work Done from December 1866 – January 1867, pgs. 1-6*." By James McNutt, Secretary of Oak Island Eldorado Co. a.k.a. the Halifax Co. Transcribed by Les MacPhie.

*"… at 40 ft a tier of charcoal, at 50 ft a tier of smooth stones from the beach with figures and letters cut on them, at 60 ft a tier of manilla grass and the rind of a coconut… after clearing off the dirt and sand, found a pit covered with the same kind of grass and coconut rind as found at 60 ft in the pit."*

***7***. "*The Early History of Oak Island and of the Drilling by the Halifax Company Carried out in December 18 and January 1867*." By James McNutt, Secretary of Oak Island Eldorado Company (Halifax Co.), in 1867. Transcribed by Les MacPhie.

"Acquired from Amos Naus, who got it from E. Hamilton in 1941. [*Zoysia matrella*, a.k.a. manila templegrass, manila grass, zoysia grass, and species *Zoysia japonica*, both grew in Japan and Mexico.] "*…a mining augur hole in it also a piece of a stick chipped with the appearance of the plank resting on it. Also oak chips and* ***manila grass*** *and two large smooth stones that had been taken off the surface of the earth.*"

***8***. "*Affidavit of S.C. Fraser to Mr. A.S. Lowden, dated June 19, 1895*." Acquired by Frederick L. Blair. From riggs Corner, Queens, New Brunswick, Canada. 5 pages.

*"The pamphlet says, "East India Grass," it is not; but coconut fibre nearly as well preserved as what I took off the coconut when examining and comparing them. Considerable of this was found among the sand, last summer, and carried away by visitors. Although it had been there perhaps 200 years, it is in a good state of preservation yet."*

***9***. *"Letter Gilbert D. Hedden by R.V. Harris, October 26, 1937*." Passing along findings by Harvard University's A.F. Hill on fiber identification. Canadian Archives, MG-1, Vol. 381, 1264.

*"The Harvard Museum writes as follows; 1) The material has suffered somewhat from its burial in the ground, but even as it is readily distinguishable as Manila hemp, the external appearance is misleading, but typical Manila hemp fibers are to be noted in a microscopic examination of macerated material. 2) It seems quite logical to surmise that the deposit on the shores of Oak Island in Mahone Bay represents the partly disintegrated remains of some ship's cables or hawsers."*

***10***. "*Letter to Robert Dunfield by R.V. Harris*." Passing along findings by Dept. of Obstetrics and Gynecology, The Albany Medical College of Unition University, Albany, NY. January 31, 1966. Canadian National Archives, MG1, Vol. 383.

*"Mr. Kirwan and the members of the Laboratory Staff, after spending considerable time in the examination of this hair sample, have found no evidence that would permit the scientific conclusion that it is human hair. In his opinion, it is an animal hair of unidentified origin."*

***11***. *"Letter to The Oak Island Exploration Co., care/of, Jon Ergin. October 7, 1970*." By C.H. Schofield, National Research Council of Canada.

*"As requested in our telephone conversation of September 14, 1970, and your letter of September 17, 1970, I forwarded four samples of fibrous material from the beach at Smith's Cove Oak Island to Dr. J.H. Soper, Chief Botanist, National Museum of Natural Sciences. Coconut fibers were identified in three of the four samples."*

***12***. "*Telephonic Notes by D`Arcy O`Connor interview of Robert R. Dunfield, October 21, 1976*."

*"Yes, the coconut fiber was analyzed to be coir, a fibrous mass between the coconut shell and the outer husk, which was used as dunnage in the early days of primitive shipping."*

***13***. "*Oak Island Hydrogeology, Hydrography and Nearshore Morphology, July – August 1995, Field Observations*." By David G. Aubrey, Wayne Spencer, Ben Guiterez, William Robertson, and David Gallo. Unpublished Draft Report. Woods Hole Oceanographic Institution, Woods Hole, Maine. April 8, 1996. 151 pages.
https://www.oakislandtours.ca/les-macphie-research.html .

***14***. "*Comparison of Coconut Coir and Date Palm coir (sheath fiber) and Their Composites*." By Mohamad Midani*, Lobna A. Elseify*, Tamer Hamouda, and Ahmed H. Hassanin. Published in Coir Fiber and its Composites, 2022, Elsevier Ltd.
DOI: https://doi.org/10.1016/B978-0-443-15186-6.00070-9

*"Cited references regarding Lacuna for coir, no Lacuna for date palm: [7] L.Q.N. Tran, T.N. Minh, C.A. Fuentes, T.T. Chi, A.W. Van Vuure, I. Verpoest,*

*"Investigation of microstructure and tensile properties of porous natural coir fibre for use in composite materials," Ind. Crops Prod. 65 (2015) 437–445. https://doi.org/10.1016/j.indcrop.2014.10.064."* And...

*[8] A.Al-Khanbashi, K. Al-Kaabi, A. Hammami, "Date palm fibers as polymeric matrix reinforcement: fiber characterization," Polymeric. Composites. 26 (2005) 486–497. https://doi.org/10.1002/pc.20118.*

*"The microstructural features of coir fibers are observed using Scanning Electron Microscopy (SEM). The cross-sectional shape of both coconut and date palm coir are circular and have a cellular structure made up of hollow fibrils bonded together by a primary layer as shown in Fig. 15.5. However, the coconut coir has a large central lumen known as a lacuna which is not observed in date palm coir [7,8]." See: "[7] - Fibre internal microstructure and porosity In Fig. 2, a typical cross section of a coir fibre indicates that a technical coir fibre comprises numerous elementary fibres with a lumen inside. The larger hole, which is approximately located in the centre of the technical fibre, is called lacuna." See: "[8] - "Influence of water absorption on mechanical properties of coconut coir Fiber/ Poly-Lactic acid Biocomposites." Article in Materials Physics and Mechanics. Jan. 2011. Coconut coir also contains a central hollow portion that runs along the fiber axis (lacuna).*

***15***. "*Comparative study of the characteristics of green and brown coconut fibers for the development of green composites*." By M. Lomelí-Ramírez, R. Anda, K. Satyanarayana, G. Bolzon de Muniz, and S. Iwakiri. (2018). Published in *BioResources*. 13(1). NC State University. See: Physical Properties, Dimensions and morphology. Pgs 1637-1660. https://bioresources.cnr.ncsu.edu/resources/comparative-study-of-the-characteristics-of-green-and-brown-coconut-fibers-for-the-development-of-green-composites/

*"Figures 2 & 3 show SEM images of green lignocellulosic coconut fibers obtained from SEM study, both in the transverse and longitudinal directions, respectively. While Fig. 2a shows the cross-sectional view of the fiber, Fig. 2b is the enlarged view of the center of Fig. 2a. Figure 2c is a higher magnification of part of Fig. 2b. As shown, the fiber was multi-cellular, containing cells with a polygonal shape joined at the surface, and it had a large empty space called a 'lacuna' at the center of individual cells. The cells (micro fibrils) were of different sizes but had thick walls. There was a hole at the center of each of microfibers called a lumen, which can vary in size. Such observations have been reported for coir fibers from other regions (Khalil* et al. *2006; Tomczak* et al. *2007; John and Anandjiwala 2008)."*

***16***. "*Oak Island Hydrogeology, Hydrography and Nearshore Morphology, July – August 1995, Field Observations*." By David G. Aubrey, Wayne Spencer, Ben Guiterez, William Robertson, and David Gallo. Unpublished Draft Report. Woods Hole Oceanographic Institution, Woods Hole, Maine. April 8, 1996. 151 pages. https://www.oakislandtours.ca/les-macphie-research.html .

***17***. *"Dr. Vincent Battesti* Email Response, Dated February 2, 2024."* Centre National de la Recherche Scientifique / French National Centre for Scientific Research.

*"Yes, it is rather strange…! I didn't know about this discovery… in Nova Scotia!? From 1185-1330 CE? Fascinating. I can see why you're working on it… Well, in fact, this fibre, fibrillum or "līf" in Arabic, comes from the degradation of date palm*

*sheaths. The fibrillum is recovered when date palm is cleaned each year. It is widely used in all oasis of the Sahara & Arabia for handicrafts, particularly basketry, but also to make rope. And this may be of interest to you, it is known in the Sahara that local populations prefer to use rope made from līf (instead of goat or sheep hair) because they resist water well (when you use a rope to draw water). I'm surprised by the period (12th-14th c) but I don't know anything about the historical population of this part of the world. In any case, it involves a plant strictly from the Old World… and only known in its domestic state. The Judean Date Palm is simply a date palm (Phoenix dactylifera). It's just that Romans liked it for its fruit (not sure if it was a cultivar or not). Why do you mention it? Anyway, keep me in the loop, it makes me very curious. By the way, I am travelling, fieldwork mission, so not really available. No time right now to read your document, but thanks ! I'll do it later. Just few words about your message; I really don't understand how you so easily jump from your 'timeline' (12-14th c.) to… Antiquity & Jericho (scientific rigor is essential!). The old world is full of date palms! All the best."*

***18***. ***"****Dr. Dennis Johnson* Email Response, Dated February 1, 2024."*
*"Thanks for the second try with the document, which I was able to open and read. I have of course heard of Oak Island, but never read any substantive about it. I must compliment you on your research into the fiber in question. As far as I can tell, you didn't miss anything in terms of references. And you contacted palm specialists I know, i.e., Zona, the late Uhl and Guanches. Without any preconceptions, my first thought about the fiber went to shipbuilding and caulking. Mention of a European source made me think of crin vegetal, an anciently used fiber in the Mediterranean Region, derived from the European fan palm, Chamaerops humilis, which occurs north and south of the Med. I would think any palm leaf base fibers could be used much in the way coconut coir is. Crin vegetal's major historical use was in cushion stuffing, probably mattresses too. The fact that crin vegetal was available in the Med. Would suggest it being more easily obtained and shipped to Oak Island than coir from Kerala. Best of luck with your quest."*

***19***. *"Plant Hair Definition, La Langue Française."* Published online Wiktionary. Noun phrase – French, Vegetable hair. \kʁɛ̃ ve.ʒe.tal\ *masculine.*
https://www.lalanguefrancaise.com/dictionnaire/definition/crin-vegetal#0

***20***. *"Forensic Science and the Scientific Method."* By Dr. Thomas W. Young. Published Online at Heartland Forensic Pathology, LLC.
https://www.heartlandforensic.com/writing/forensic-science-and-the-scientific-method/

***21***. "*Archaeobotany vs. Paleoethnobotany vs Paleobotany*." By Nathan Smiti. Published online at Habits of a Travelling Archaeologist, February 5, 2018.
https://habitsofatravellingarchaeologist.com/archaeobotany-vs-paleoethnobotany-vs-paleobotany/

***21b***. "*Ancient Floras, Vegetational Reconstruction and Man-Plant Relationships: Case Studies from Archaeological Sites*." By Marta Mariotti Lippi. Bocconea 24: Pgs 105-113 2012. — ISSN 1120-4060.

***22***. "*The Date Palm (Phoenix dactylifera L.): Overview of Biology, Uses, and Cultivation*." By Chih Cheng, T Chao, and Robert R. Krueger.

***23***. "*Comparative study of the characteristics of green and brown coconut fibers for the development of green composites*." By M. Lomelí-Ramírez, R. Anda, K. Satyanarayana, G. Bolzon de Muniz, and S. Iwakiri. (2018). Published in *BioResources*. 13(1). NC State University. See: Physical Properties, Dimensions and morphology. Pgs 1637-1660 https://bioresources.cnr.ncsu.edu/resources/comparative-study-of-the-characteristics-of-green-and-brown-coconut-fibers-for-the-development-of-green-composites/

***24***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***25***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***26***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***27***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***28***. "*Comparative study of the characteristics of green and brown coconut fibers for the development of green composites*." By M. Lomelí-Ramírez, R. Anda, K. Satyanarayana, G. Bolzon de Muniz, and S. Iwakiri. (2018). Published in *BioResources*. 13(1). NC State University. See: Physical Properties, Dimensions and morphology. Pgs 1637-1660 https://bioresources.cnr.ncsu.edu/resources/comparative-study-of-the-characteristics-of-green-and-brown-coconut-fibers-for-the-development-of-green-composites/

***29***. "*The Date Palm (Phoenix dactylifera L.): Overview of Biology, Uses, and Cultivation*." By Chih Cheng, T Chao, and Robert R. Krueger.

***30***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Department of Chemistry, Faculty of Science, Sultan Qaboos University, Muscat, Oman.

***31***. "*The Date Palm (Phoenix dactylifera L.): Overview of Biology, Uses, and Cultivation*." By Chih Cheng, T Chao, and Robert R. Krueger.

***32***. "*The Sweet and Sticky History of the Date*." By Matti Friedman. Published online at Smithsonianmag.com. www.smithsonianmag.com/history/sweet-sticky-history-the-date-180980983/

*"…And now back to Masada, the site of King Herod's fortress and the Jewish rebels' last stand in the revolt against Rome. The site was excavated by Israeli archaeologists in the 1960s. Among striking artifacts that included biblical scrolls, jewelry, weapons, cosmetics and sandals belonging to the rebels, they found a number of seemingly inconsequential items, including date pits… Although they were 2000 years old, she* [Sarah Sallon] *had the strange idea that she could make them grow."* And

*"Date palms have been domesticated for so long that it's easy to forget they once grew wild. Occasionally you'll see a palm growing alone somewhere like a gleefully escaped convict, feral and unkempt, surrounded by offshoots protruding from the trunk, looking less like a tame orchard tree than like a fierce bush. These are cultivated palms gone rogue, not authentically wild trees."*

***33***. "*Comparative study of the characteristics of green and brown coconut fibers for the development of green composites*." By M. Lomelí-Ramírez, R. Anda, K. Satyanarayana, G. Bolzon de Muniz, and S. Iwakiri. (2018). Published in *BioResources*. 13(1). NC State University. See: Physical Properties, Dimensions and morphology. Pgs 1637-1660 https://bioresources.cnr.ncsu.edu/resources/comparative-study-of-the-characteristics-of-green-and-brown-coconut-fibers-for-the-development-of-green-composites/

***34***. "*The Date Palm (Phoenix dactylifera L.): Overview of Biology, Uses, and Cultivation*." By Chih Cheng, T Chao, and Robert R. Krueger.

***35***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***36***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***37***. "*Date Palm Tree (Phoenix dactylifera L.): Natural Products and Therapeutic Options*." By Reem A. Al-Alawi, Jawhara H. Al-Mashiqri, Jawaher S. M. Al-Nadabi, Badria I. Al-Shihi and Younis Baqi. Dpt. of Chemistry, Science Faculty, Sultan Qaboos University, Muscat, Oman.

***38***. "*The Date Palm Byproducts: Description, History of Utilization and Associated Technological Heritage, Chapter*." By Hamed El-Mously, Mohamad Midani*, Eman Atef. publication at: https://www.researchgate.net/publication/370505214 see...

*2.5.3.5 Date Palm Leaf Sheaths Fiber. Leaf sheaths fibers are in the form of tissue covering the new date palm leaves as they come out and grow [8]. After growth, this tissues remain attached to the palm trunk. This tissue turns into a brownish coarsely woven fabric, after drying & can be torn away during the annual pruning [8]. They are used for protecting the newly planted offshoots, shadings, brushes and fishnets. Date palm leaf sheaths fiber tissues are shown in Fig. 2.16.*

***39***. "*The Parable of the Date Palm Tree and the Believer in the Hadith: A Correlation Study of Characteristics Date Palm and Believers*." By Muhammad Nurfaizi Arya Rahardja and Elan Sumarna. Publication at: https://www.researchgate.net/publication/378866558

*Pg. 78. "Another special characteristic of the date palm tree is that it has leaves that never fall off. This is proven by modern researchers who say that the date palm tree is a tree that is always green throughout the year The date palm tree is a very sturdy and resistant tree even in extreme conditions, such as drought, heat, and storms, the date palm tree will still grow and survive (Al-Najjar, 2011)."*
*Pg. 79. "Chao and Krueger mentioned that date palm trees are able to grow in very hot and dry weather, shielded by their dead branches, and are also very tolerant of various types of soil(Chao & Krueger, 2007). It is mentioned that date palm trees can even survive in extreme temperatures of up to 50 degrees Celsius."*

***40***. **"***The Assyrian Stylized Tree: A Date Palm Plantation and Aššurnaṣirpal II's Stemma***."** By Norma Franklin*, University of Haifa. Published in *Ash-sharq*, Volume 5, 2021: Page 81. Abstract: Aššurnaṣirpal II (r. 883–859 BC) moved his capital.

*P.81. "It is important to understand that a date palm with a single trunk is not the natural form of the tree; instead, it is a cultivated date palm that is constantly tended to. A date palm left to nature is not economically valuable, is rarely found, and, of specific relevance to this paper, is not depicted on any known Assyrian reliefs. The easily recognizable, realistic-looking date palms portrayed on reliefs are cultivated date palms, featuring a single visible trunk, a date droop, and two basal offshoots. In fact, these reliefs prove that only female date palms, with a controlled number of offshoots were being cultivated in Assyria. Giovino (2007: 28–29, 93, 113–114, 119) mistakenly employs the terms "the natural form of a date palm," and "natural-looking date palm." However, a date palm left unattended will revert to its natural form, continually producing offshoot after offshoot; each of these offshoots will grow into a mature date palm that will also produce its own offshoot All the offshoots will remain attached to the original palm, and as each offshoot will have its own palm crown, these multiple crowns will form a vast palm canopy that will obscure from view the trunk of the original palm as well as the trunks of the mature offshoots Therefore, Giovino should have used the term "the form of a cultivated date palm," or "cultivated date palm" when describing a date palm with a single trunk. In addition, in fig. 39 two palms are shown, but misleadingly one is not a date palm, although it does belong to the palm family. These inaccuracies serve to highlight the fact that a lack of botanical knowledge has unfortunately plagued the analysis of the Assyrian stylized tree. Basal offshoots were always added to the realistic depictions of cultivated date palms on the reliefs from the palaces of Sennacherib and Aššurnaṣirpal."*

***41***. "*On the Necessity of Combining Ethnobotany and Genetics to Assess Agrobiodiversity and its Evolution in Crops: A Case Study on Date Palms (Phoenix dactylifera L.) in Siwa Oasis, Egypt*." By Muriel Gros-Balthazard*, Vincent Battesti*, Sarah Ivorra, et. al. Published on wileyonlinelibrary.com/journal/eva. *Evolutionary Applications*. 2020;13: Page 1820. Accepted Jan 31, 2020. https://doi:10.1111/eva.12930 .

*"In Egypt, the date palm seems exploited or cultivated sporadically since the Old Kingdom (about 2700–2200 BCE), but phoeniciculture is only established since the New Kingdom, about 1600–1100 BCE (Tengberg & Newton, 2016). Genetic analyses of the current date palm germplasm identified two differentiated genetic clusters in*

*North Africa and the Middle East, with evidence of gene flows, especially in Egypt (Flowers et al., 2019; Gros-Balthazard* et al., 2017; Hazzouri et al., 2015; Mathew et al., 2015; Zehdi-Azouzi et al., 2015)"*

***42***. "*The Date Palm (Phoenix dactylifera L.): Overview of Biology, Uses, and Cultivation*." By Chih Cheng, T Chao, and Robert R. Krueger.

## Chart: **Repeating References use the same citation number listed here.**

***43***. "*Coconut – History, Uses, and Folklore*." By Subhash Chanda Ahuja. CCS Haryana Agricultural University. Article in *Asian-History Journal*. 29 pages. January 2014.

***44***. "*The First Identification of Phoenix dactylifera (Date Palm) from Early Bronze Age Lebanon*." By Alison Damick.

***45***. "*The History of the Date Through the Ages in the Holy Land*." By Asaph Goor. Ministry of Agriculture, Jerusalem, Israel.

***46***. "*Oak Island Mystery Trees and other Forensic Answers - Fibrosity*." By David H. Neisen, Christopher L Boze, and Brent Sallans, 2024. Chapter 7, *Knights for a New World*.

***47***. "*EN - Biofuels from Coconuts*." By Kishna Raghaven*. 2010. 107 pages. Para. 1.1 Quantity and Energy Content of Parts of the Coconut Palm, Fig. 1 and Table 1. Biodegradability Section, Page 16. www.energypedia.info/f/f9/EN-biofuels_from_cocnuts-krishna_raghaven.pdf .

***48***. "*The Encyclopedia of Fruit & Nuts*." Edited by Jules Janick and Robert E. Paull. Published in *Araceae*, CABI, 2008. Coconut Palm, pgs. 107-118. Date Palm, Pgs. 138-151.

***49***. "*Coir fiber process and opportunities, 1-2*." By Akhila Rajan, at Govt. College Kozhinjampara. Published in The *Journal of Natural Fibers*, Vol. 3(4) 2006 & January 2008. The Hawthorne Press. https://doi: 10.1300/J395v03n04_03 .

***49b***. *"Dr. Vincent Battesti* Email Response, Dated February 2, 2024."* Centre National de la Recherche Scientifique / French National Centre for Scientific Research.

*"And this may be of interest to you, it is known in the Sahara that local populations prefer to use rope made from Īf (instead of goat or sheep hair) because they resist water well (when you use a rope to draw water)."*

***50***. "*Date Palm Byproducts: A Springboard for Circular Bio Economy*." By Hamed El-Mously*, Mohamad Midani*, Eman A. Darwish. Part of *Materials Horizons: From Nature to Nanomaterials* series. 2023. Springer Nature.

***51***. "*Coconut Fibre: Its Structure, Properties and Applications*." By Leena Mishra and Gautam Basu. National Institute of Natural Fibre Engineering & Technologies Institute. Kolkata, West Bengal India. Section Yield of Coconut Fibre, Page 7, para. 10.2.1.3. Yield of Coconut Fibre. Researchgate. Pub. 339284598. February 2020. 27 Pages.

***52***. "*A Review on Date Palm Tree: Properties, Characterization and its Potential Applications*." By Mehdi Jonoobi, Masoud Shafie, Younes Shirmohammadli, Alireza Ashori, Hamid Zarea-Hosseinabadi, and Tizazu Mekonnen. Published in Journal of Renewable Materials. https://doi:10.32604/jrm.2019.08188

***53***. "*Review on Cellulosic Fibers Extracted from Date Palms (Phoenix dactylifera) and their Applications*." By Lobna A. Elseify*, Mohamad Midani*, Lamia A. Shihata, and Hamed El-Mously*, October 1, 2018. Published in Cellulose, (2019), Pgs 2209-2232. https://doi.org/10.1007/s10570-019-02259-6

***54***. "*Comparison of Coconut Coir and Date Palm coir (sheath fiber) and Their Composites*." By Mohamad Midani*, Lobna A. Elseify*, Tamer Hamouda, and Ahmed H. Hassanin. Published in Coir Fiber and its Composites, 2022, Elsevier Ltd. DOI: https://doi.org/10.1016/B978-0-443-15186-6.00070-9

> *"Cited references regarding Lacuna for coir, no Lacuna for date palm: [7] L.Q.N. Tran, T.N. Minh, C.A. Fuentes, T.T. Chi, A.W. Van Vuure, I. Verpoest, "Investigation of microstructure and tensile properties of porous natural coir fibre for use in composite materials," Ind. Crops Prod. 65 (2015) 437–445. https://doi.org/10.1016/j.indcrop.2014.10.064."* And…
>
> *[8] A.Al-Khanbashi, K. Al-Kaabi, A. Hammami, "Date palm fibers as polymeric matrix reinforcement: fiber characterization," Polymeric. Composites. 26 (2005) 486–497. https://doi.org/10.1002/pc.20118.*

***55***. "*Coir Process Technologies: Improvement of drying, softening, bleaching and dyeing coir fibre/yarn and Cellulose*." By J.E.G. van Dam. Agrotechnological Research Institute (ATO by), Wageningen, The Netherlands. No. 6. Common Fund Commodities. 2002.

***56***. "*Review on Cellulosic Fibers Extracted from Date Palms (Phoenix dactylifera L.) and their Applications*." By Lobna A. Elseify*, Mohamad Midani*, Lamia A. Shihata, Hamed El-Mously*.

> *"Moreover, according to a study made by El Mously* in 1995, it was found that a single female date palm tree produces annually a dry weight of 9.75 kg of midribs, 7 kg of spadix stems, 8 kg of leaflets, and, 1.25 kg of mesh (El-Mously*, 2005)."*

***57***. "*International Maritime Dangerous Goods Code (IMDG) – Coconut Coir Fiber*." By International Maritime Organization (IMO), 2023. Transport Information Service, https://www.tis-gdv.de/tis_e/ware/fasern/kokosfa/kokosfa-htm/

> *"In damp weather (rain, snow) the cargo must be protected from moisture since coconut fiber is strongly hygroscopic (hygroscopicity). It must be protected from sea, rain, and condensation water and also from high levels of relative humidity, if decay, staining, self-heating, mold, attack by microorganisms, and rusting of the steel strapping are to be avoided. Rusty strapping contaminates the coconut*

*fiber and reduces its value. This cargo is to be secured in such a way that the bales/hanks or strapping are not damaged. Undamaged strapping is essential to maintaining compression of the bales during transport. If the strapping is broken, compression is diminished, which at the same time results in an increased supply of oxygen to the inside of the bales. This in turn increases the risk of combustion or feed a fire which has already started. Bursting or chafing of steel strapping may lead to sparking and external ignition. Coconut fiber must be stowed away from any heat sources. If the product is loaded for shipment in a dry state, it does not have any possible ventilation conditions. Problems arise if the product, packaging and/or ceiling/flooring are too damp. Since coconut fiber very readily absorbs oxygen, before anybody enters the hold, it must be ventilated and, if necessary, a gas measurement carried out, since a shortage of oxygen endangers life. Coconut fiber has an oil content of 2-5% (coconut oil). Coconut fiber is assigned to the Class of Flammable Solids. However, its specific characteristics and negative external influences may cause them to behave like a substance from the Class of Spontaneous Combustion. Spontaneous combustion may occur as a result of exposure to moisture, animal and vegetable fats/oils, oil-bearing seeds/nuts, copra, and raw wool. This risk is further increased by the coconut oil present in coconut fiber. Coconut fiber is very highly susceptible to self-heating due to moisture. Firefighting is best performed using $CO_2$ or foam. It is very difficult to extinguish a fire because of the excess of oxygen in the coconut fiber, which maintains the fire from the inside. When fighting a fire, do not break the steel straps or open the bales, since relieving the compression increases the oxygen supply and makes it impossible to fight the fire effectively. Coconut fiber has a slight, unpleasant odor. A conspicuous musty odor indicates moisture damage inside the bale. Since coconut fiber may easily cause odor-tainting, it must not be stowed with odor-sensitive products (e.g., foodstuffs). Coconut fiber causes contamination due to the coconut oil it contains and must therefore be stowed away from easily stained products. Since coconut fiber is highly oxygen-absorbent, a life-threatening shortage of oxygen may arise in the hold or container."*

***58***. "*International Maritime Dangerous Goods Code (IMDG) – Palm Fiber*." By International Maritime Organization (IMO), 2023. Transport Information Service, https://www.tis-gdv.de/tis_e/ware/fasern/palmfase/palmfase-htm/#anfang

***59***. "*What is an Arid Climate*." By Victor Kiprop, May 13, 2019. Published Online @ World Facts. https://www.worldatlas.com/articles/what-is-an-arid-climate.html (Accessed 2-3-2024).

***60***. "*Exploring the Potential of Waste Leaf Sheath Date Palm Fibres for Composite Reinforcement Through a Structural and Mechanical Analysis*." By Alain Bourmaud, Hom Dhakal, Anouck Habrant, Justine Padovani, David Siniscalco, Michael H. Ramage, Johnny Beaugrand, and Darshil U. Shah. Université de Bretagne Sud, IRDL, CNRS FR.

*"The cellulose content is well correlated with value of (Saadoui et al.) on palm fibrillum and is in the same range as bamboo or [coconut] coir fibres. Our samples are characterized by an important lignin content in vascular cambium tissues, i.e., palm, bamboo, sisal or coir. Lignin is preponderant for the plant and contribute to*

*its protection against exogenous attacks (water, insects, etc.) by reinforcing the bundle stiffness."* And…*"Comparing to (Hill et al.) data on various natural fibres, the date palm fibres have very similar isotherm profiles to coconut coir palm and Sitka spruce wood, including the total moisture content at a given relative humidity and the high degree of hysteresis exhibited."*

***61***. "*How Long do Dates Last and How to Store Them*?" By Marcin Skrzypiec. Published online @ Doesitgobad.com. Last updated Sep. 12, 2023. (Accessed 2-19-2024). See www.doesitgobad.com/do-dates-go-bad/

Chart: **Cited References End**

***62***. "*Origins and insights into the historic Judean Date Palm Based on Genetic Analysis of Germinated Ancient Seeds and Morphometric Studies*." By Sarah Sallon*, Emira Cherif, Nathalie Chabrillange, Elaine Solowey*, Muriel Gros-Balthazard*, Sarah Ivorra, Jean-Frédéric Terral, Markus Egli, Frédérique Aberlenc. Published in *Sciences Advances*, 6, 2020.

***63***. *"Hybridization in the Genus Phoenix: A Review."* By Muriel Gros-Balthazard*. Published in *Emirates Journal of Food and Agriculture*, April 2013. https:DOI:10.9755/ejfa.v25|11.16660. Article includes accompanied map.

***64***. "*DATE PALMS (also known as Phoenix Palms): Definition of a Date Palm and Descriptions of the main Phoenix Species*." Bu Phil Bergman. Last updated Feb. 13, 2024. https://www.junglemusic.net/articles/DatePalms.html

*"Date Palms are historically important type of palm tree because they are a source of food that has supplied nutrition to millions of people over thousands of years. But, before we can really talk about "Date Palm Trees," When you talk to a taxonomist or palm enthusiast and say, "Date Palm", he will automatically think of the true Date Palm, Phoenix dactylifera. This is the species that makes date fruit that is commonly eaten. But, when you talk to the average person, "Date Palm" may mean any palm in the group or in fact, any palm at all. When we talk about the Date Palm we are discussing group of palms known as Phoenix palms. This genus would include everything from the true Date Palm, Phoenix dactylifera, to the Canary Island Date Palm, Phoenix canariensis. Many have heard of the Pygmy Date Palm. It is in this genus Phoenix as well. But, only one plant, the true Date Palm, gives fruit that is edible and marketable."*

***65***. *"How King Solomon and the Romans Shaped the Judean Date Palm."* By Ruth Schuster. Published online at Haaretz, *Archaeology*, Mar. 30, 2022. **https://www.haaretz.com/archaeology/2022-03-20/ty-article/how-king-solomon-and-the-romans-shaped-the-judean-date-palm/00000180-5bc7-db1e-a1d4-dfe71c180000**

***66***. "*Oak Island Hydrogeology, Hydrography and Nearshore Morphology, July – August 1995, Field Observations*." By David G. Aubrey, Wayne Spencer, Ben Guiterez, William Robertson, and David Gallo. Unpublished Draft Report. Woods Hole Oceanographic Institution, Woods Hole, Maine. April 8, 1996. 151 pages. https://www.oakislandtours.ca/les-macphie-research.html .