The dwarf palm tree of the king: Nannorrhops ritchiana in the 24th-23rd century BC palace of Jericho.

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The dwarf palm tree of the king: a *Nannorrhops ritchiana* in the 24th-23rd century BC~~E~~ palace of Jericho.

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Abstract

Charred botanical finds from the excavation of the Early Bronze Age city of Jericho (Tell es-Sultan), one of the earliest urban centers of 3rd millennium BC~~E~~ Palestine, were collected during the 2015-2017 excavation seasons carried out by Sapienza University of Rome and the Palestinian MoTA-DACH. Among other plant macro-remains, a round fruit was found in the subsidiary room behind the throne room of ~~the~~ Royal Palace G, next to a vase, in the burnt filling overlying the platform.

It was identified as a drupe of a dwarf palm, ~~thanks to~~through classical archaeobotanical techniques and computed tomography scan. Two dwarf palms ~~have been~~were taken into consideration: the Mediterranean dwarf palm (*Chamaerops humilis* L.) and the Mazari palm (*Nannorrhops ritchiana* (Griff.) Aitch.~~;~~ native to the Saharo-Indian region), both with small, round/oval fruits, none of which currently grows in the area of Jericho. ~~Thanks to a~~A detailed analysis of iconography, archaeobotanical literature and herbarium samples of both species stored in Rome (RO), Florence (FIAF) and Edinburgh (E), ~~it was possible~~has allowed to identify the charred drupe as *Nannorrhops ritchiana*. Its presence in the palace suggests the existence of

an overland commercial track to the south-east, across the desert of Saudi Arabia, which only recent excavations and other finds have revealed.

Keywords: Jericho, *Nannorrhops ritchiana*, Sacred Tree, archaeobotany, iconography, Early Bronze Age

Introduction

Tell es-Sultan is located in the Jericho Oasis (Fig. 1), 3 km from the centre of the present town of Ariha, in Palestine, at an altitude of 220 meters below sea level (Barkai and Liran 2008; Nigro 2014a~~, p. 25-28~~). The climate of the area is classified as arid, with hot summers and warm winters with very rare frost incidents (Mimi and Jamous 2010). The present-day vegetation has been described as a Sudano-Deccanian enclave, constituted mostly of a *Ziziphus spina-christi* (L.) Desf. (Christ's thorn jujube) - *Balanites aegyptiaca* Delile (desert date) association. Other species include *Acacia tortilis* (Forssk.) Hayne, *Cal~~l~~otropis procera* Aiton and *Solanum incanum* L. (Zohary 1947). *Ceratonia siliqua* L. and *Cupressus sempervirens* L. are among the plants that have been adapted in the area of Jericho (Ighbareyeh 2019).

[Fig. 1 near here]

The Archaeological Expedition to Jericho of the Sapienza University of Rome and the Palestinian MoTA-DACH (Ministry of Tourism and Antiquities, Department of Antiquities and Cultural Heritage) has been committed in the excavation of the Early Bronze Age city of Tell es-Sultan, one of the earliest urban centers of 3rd millennium BC~~E (Before Common Era)~~ Palestine (Nigro and Taha 2009; Nigro et al. 2011; 2015; Nigro 2016; Nigro 2020a). Excavations unearthed a monumental fortification system (Areas B; F, L), the northern dwelling quarter (Area F), and royal Palace G, the major administrative center of the city.

A severe earthquake led to a sudden end of the life of the earliest fortified city of the Early Bronze (EB) II (Sultan IIIb Period) towards the end of the 28th century BCE (Nigro 2014b, p. 72). The city was immediately rebuilt (2700-2500 BCE, EB IIIA, Sultan IIIc1 Period), as the life resources of the city were not swept away by the upheaval. The reconstruction of the city, thus, became an opportunity to strengthen the defensive system, with the erection of a new double city-wall with rectangular towers and blind rooms in between the outer and inner city-walls (Sellin and Watzinger 1913, p. 20-33; Garstang 1930, p. 128-129; 1931, p. 191-192; Kenyon 1981, p. 161-163, p. 210-213; Marchetti and Nigro 1998, p. 81-94, p. 129-130; Nigro 2016, p. 9-10). A major enterprise of this second urban stage was the reconstruction and enlargement of the palace on the eastern flank of the "Spring Hill" overlooking the spring and the oasis (Sellin and Watzinger 1913, p. 39-42; Garstang 1932, p. 17-18; Kenyon 1981, p. 344-346; Nigro et al. 2011, p. 586-592; Nigro 2016, p. 10-11; Nigro 2017, p. 159-162; Nigro 2020b, p. 203-204). The palace was subdivided into three wings each on a different terrace descending down to the spring. The main entrance of the palace was on its southern side and opened onto a square in the main street which climbed the Spring Hill in a northerly direction. It led to the middle terrace, where a porch opened onto a hall with a raised podium on its north side, a reception suite, flanked by a small subsidiary room (Fig. 2). Some stairs led to the upper storeys which presumably hosted the royal apartments.

[Fig. 2 near here]

The upper terrace was accessible directly from the main street, through a door in the western perimeter wall of the palace. It hosted industrial installations, with rooms for food preparation and other workshops (perhaps also a smith). A third entrance to the palace was located on the eastern lower terrace and connected directly with the spring area and the market just inside the

city gate. This door gave access to the administrative and storage wing of the building, and to a corner tower which possibly also served to control the access to the main street from the market area.

Several finds from the palace may illustrate multiple functions of this building. A copper axe and a dagger (with the preserved part of the handle) were found in the courtyard of the lower wing (Kenyon 1981; Nigro 2016; Nigro 2020), while a basalt potter's wheel (Dorrell 1983~~, p. 559-560~~) and several stone tools, including grinding stones, pestles, polishing pebbles and flints were found in the upper western wing. In the central wing, big jars and pithoi belonged to the furnishings of the royal apartments (Nigro et al. 2011~~, p. 588~~; Nigro 2020).

The focus of this article is on a small subsidiary room behind the throne room of the palace, where a round stone platform was found abutting from a wall with two symmetrical high benches or niches. This installations was interpreted as a cultic one, because of the retrieval of the bull-shaped spout of a cultic vessel (Nigro et al. 2011~~, p. 591~~; Nigro 2016) The vase, possibly a *kernos*, was used for libation in front of a sacred image or plant, as often depicted in the art of the ancient Near East (see below).

The palace was destroyed by a fire that took place in ca. 2350 BC~~E~~ (Nigro 2017~~, p. 164-165~~; Nigro 2020~~, p. 205-207~~).

Materials and Methods

Botanical finds from the contexts referable to the final destruction of the city (ca. 2350/2300 BC~~E~~, EB IIIB, Sultan IIIc2 Period), were collected by hand-picking during the 2015-2017 seasons in order to be AMS radiocarbon dated (Nigro et al. 2019~~, p. 233-235~~).

Among the finds, a round ~~seed/~~fruit preserved by charring was found in the subsidiary room behind the throne room of the royal Palace G, next to a vase, in the burnt filling overlying the

Commented [CM1]: The mesocarp was preserved

platform. The peculiar archaeobotanical remain was observed under a Leica M205C stereomicroscope at the Laboratory of Archaeobotany and Palynology in the Department of Environmental Biology of Sapienza University of Rome. High resolution images were acquired using the Leica IC80 HD photo camera and to the program Leica Application Suite, version 4.5.0. These were later processed using Helicon Focus, version 6.6.1 Pro, which allows to blend together shots of the same sample taken at different focus. The precise measures of the fruit's diameter were obtained using the ImageJ 1.51j8 software.

In order to assess the nature of the remain, a computed tomography scan was performed at the Radiology Department of the "Policlinico Umberto I" of the Sapienza University of Rome. Identification was carried out through the consultation of atlases (Neef et al. 2012), digitized herbarium samples from the Royal Botanic Garden of Edinburgh (2018) and from the Museum Herbarium of the Sapienza University of Rome, as well as fresh samples from the Botanical Garden of the Sapienza University of Rome.

Results

The observations under the stereomicroscope allowed to describe the fruit as globose, having a smooth and uniform surface without longitudinal grooves (Fig. 3).

[Fig. 3 near here]

The specimen presents a stigma scar on its base and a pedicel scar on its apex. The measured diameter is of 12 mm. The computed tomography scan allowed to determine the presence of one endocarp, having a different density than the rest of the fruit, leading the specimen to be classified as a drupe (Fig. 4), a fruit containing a stone seed.

[Fig. 4 near here]

The described features closely correspond to palm fruits. While five Arecaceae genera are currently found in the Mediterranean basin and the Near and Middle East (*Chamaerops*, *Hyphaene*, *Medemia*, *Nannorrhops* and *Phoenix*; Dransfield et al. 2014), only the fruits of *Chamaerops humilis* L. (Mediterranean dwarf palm) and *Nannorrhops ritchiana* (Griff.) Aitch (Mazari palm or dwarf palm) ~~seem to~~ correspond to the description. The two species are very similar to each-other and none of them currently grows in the Levant.

The Mazari palm (Fig. 5) is a small gregarious perennial palm, with grayish green leaves, which is able to reach a height of approximately 5 meters in optimal conditions. Native to the deserts of the Saharo-Indian region, it is known as one of the most robust and versatile palms, being able to tolerate temperatures as low as -12°C, but also extreme heat, insufficiency of water and harsh winds (Mahmood et al. 2017; Naseem et al. 2005). *N. ritchiana*'s fruits are described by Malik (2011 as globose or ovoid drupes of variable size in the range of 6-18 mm. Khodashenas et al. (2016) narrow the size range down to 10-13 mm.

[Fig. 5 near here]

Chamaerops humilis, the Mediterranean dwarf palm (Fig. 6), the only palm native to Europe, closely resembles *N. ritchiana*. On average, it grows between 1 to 1.5 meters in mean height, but in protected areas it can reach a height of 10 meters (Benmehdi et al. 2012). *C. humilis*'s underground rhizome produces shoots with palmate, sclerophyllous leaves. Like the Mazari palm, the Mediterranean fan palm is very tolerant to disturbance, being able to survive deforestation, fires, pasturing and cold temperatures (as low as -9°C; Bannister 2007; Herrera 1989). *C. humilis* fruits closely resemble the description of the charred specimen, being classified by Pignatti (1982) as subspherical and ovoid with size comprised between 1-3 cm. Herrera (1989) adds that they are dully yellow to brown when ripe and contain a single, stony seed.

Likewise, Morales et al. (2016) describe them as globular reddish-brown drupe, oblong or ovoid, measuring 1-4 cm.

Among the two, the analyzed remain fits more closely the description of *N. ritchiana* for the quasi-spherical shape, while size is not a discriminating feature.

Although in literature the drupes of the two species are described as being very similar, herbarium samples show otherwise. While *N. ritchiana* fruits (Fig. 5) are proven to be round, *C. humilis* fruits are clearly more elongated (Fig. 6). This points towards an identification of the charred remain as a Mazari palm fruit.

[Fig. 6 near here]

~~The identification of the archaeobotanical remain as *N. ritchiana* is also supported by digitized herbarium samples of *N. ritchiana* from the Royal Botanic Garden of Edinburgh (2018), as well as by the Digital Atlas of Economic Plants in Archaeology (Neef et al. 2012).~~

Discussion

Despite of both the fruits of *Chamaerops humilis* and *Nannorrhops ritchiana* roughly fitting the description, being ovoid and having a diameter of ca. 1 cm, we are confident in identifying the specimen from Tell es-Sultan as *Nannorrhops ritchiana*. This is motivated by Mazari palm fruits being more round than the ones of the Mediterranean dwarf palm, as can be observed by comparing the specimen of *C. humilis* from two Italian *herbaria*, *Herbarium Cesatianum* stored at the Sapienza University of Rome Herbarium (RO; Fig. 5; Millozza and Giovi 2008) and *Herbarium Universitatis Florentinae* in Florence, with the digitized herbarium sample of *N. ritchiana* from the Royal Botanic Garden of Edinburg (E; Fig. 6).

The find of a drupe of dwarf palm proves to be of great interest in the site of Tell es-Sultan, as it represents the first such archaeobotanical record in the area. The peculiarity is enhanced by the

fact that none of the dwarf species currently grows in the area of Jericho. , nor has it been recorded by archaeobotanical evidence.

The present geographical distribution of *Nannorrhops ritchiana* is currently represented by the semi-desert areas of the Middle East (Iran, Afghanistan, Pakistan and Saudi Arabia; Kubitzki et al. 1998; Gratzfeld and Khan 2015; Fig. 7). In contrast, *Chamaerops humilis* covers the central and western Mediterranean, including both the European side (S Portugal, S and E Spain, SE France, W Italy and Malta) and African countries (Morocco, N Algeria and N Tunisia; Garcia-Castano et al. 2014; Guzmán et al. 2017). In contrast, *N. ritchiana* is currently found in the semi-desert areas of the Middle East (Iran, Afghanistan, Pakistan and Saudi Arabia; Kubitzki et al. 1998; Gratzfeld and Khan 2015; Fig. 7).

[Fig. 7 near here]

Ethnobotanical and medicinal studies of the Mazari palm have attributed it many uses and properties, which may have influenced its importation to Jericho. Leaves are used for basket and rope making, the dried plant can be used as fuel, the ash as a coloring material. The principles extracted from the leaves have proven to be successful for the treatment of diarrhea and dysentery. They are also used as a purgative in veterinary practice (Marwat et al. 2011; Zabihullah et al. 2006). Inflorescences and fruits are used as food (Malik 1984). In particular, fruits are, in contrast with leaves, consumed for their laxative and purgative properties (Hussain et al. 2018). Finally, seeds are used as beads, in India they are chosen specifically for rosaries (Duthie et al. 1929; Khan and Shaukat 2006).

Archaeobotanical evidence of dwarf palms

Some considerations may be done on the geographical distribution of archaeobotanical and historical attestations of *Nannorrhops ritchiana* and *Chamaerops humilis*. Most records of the

Mazari palm are restricted to sites in Pakistan, where they are found in the form of seeds and fruits. Endocarps or fragments of endocarps were found in the 4th-2nd millennium BC sites of Miri Qalat and Shahi-Tump in the Kech valley (Tengberg 1999; Besenval et al. 2005). Fruits of *N. ritchiana* were found in samples from Period III (ca. 2700-2400 BC) in Sohr Damb, a prehistoric site in Central Balochistan, Pakistan (Neef et al. 2012). The possibility of such plant being cultivated is taken in consideration, although gathering from the wild is not excluded (Benecke and Neef 2003). Additionally, phytolith studies have allowed to identify *N. ritchiana* as the plant used for making a protohistoric net, preserved by charring in the site of Shahi-Tump (Baluchistan, Pakistan) after a fire partly destroyed a 4th millennium BC building (Thomas et al. 2012). These sites are all located within a radius of less than 500 km from each other, but 3000 km away from Madâ'in Sâlih (in Saudi Arabia), where charred stems of the Mazari palm, identified based on the anatomy of the fibrous vascular bundles, have been found in domestic contexts (Bouchaudl et al. 2011). Although more recent (2nd century BC - 7th century AD) than the find from Tell es-Sultan, this advances the idea of *N. ritchiana* being exchanged through commercial routes with the Middle East since earlier on.

The archaeobotanical and historical attestations of *Chamaerops humilis* reflect its present distribution, being restricted to the coasts of the Western Mediterranean. Stones of the Mediterranean dwarf palm were found in the Iberian Peninsula in the Iron Age site of Huelva (Pérez-Jordà et al. 2017), in the 6th millennium BCE site of Cova de les Cendres (Alicante) and in Morocco (Peña-Chocarro et al. 2015). Remains of the Mediterranean dwarf palm were also found in Early Neolithic sites of São Pedro de Canaferrim and Lapiás das Lameiras in Sintra, Portugal (López-Dóriga 2018). Charcoal fragments dating to the 1st century AD were retrieved in a garden of a rich domus in the ancient Roman town of Privernum, in southern Latium (Sadori et

al. 2010). The Mediterranean dwarf palm is also mentioned by the Roman author Pliny the Elder in his *Naturalis Historia* (Gleason 2019). *C. humilis* pollen also represents an evidence worth of notice, being found in the Mid- to Late-Holocene site of Sierra de Gàdor in Southern Spain (Carrión et al. 2003), in Holocene sediments from Gorgo Basso (Tinner et al. 2009) and of Biviere di Gela, both lakes on the southern coast of Sicily (Noti et al. 2009). The only find of the Mediterranean dwarf palm which falls outside its present distribution area is represented by ropes from the 9th century AD Bozburun Byzantine shipwreck, Turkey, identified as being made of *C. humilis* fibers based on the diagnostic cell patterns of the epidermal tissue retrieved (Gorham and Bryant 2001). Such location is set at roughly 900 km from the site of Tell es-Sultan. However, it should be considered that the find dates to the 9th century AD, much more recent than the find from Jericho. Additionally, *C. humilis* is there found in the form of fibers used in rope making, therefore not testifying the use of its fruits or of the whole plant.

~~Archaeobotanical findings of *N. ritchiana* are restricted to sites in Pakistan and the Saudi Arabian Peninsula, where they are found both in the form of seeds and fruits, as well as stem fragments. Endocarps or fragments of endocarps were found in the 4th-2nd millennium BCE sites of Miri Qalat and Shahi-Tump in the Kech valley (Tengberg 1999; Besenval et al. 2005). Fruits of *N. ritchiana* were found in samples from Period III (ca. 2700-2400 BCE) in Sohr Damb, a prehistoric site in Central Balochistan, Pakistan (Neef et al. 2012). The possibility of such plant being cultivated is taken in consideration, although gathering from the wild is not excluded (Benecke and Neef 2003). Charred stems of *N. ritchiana* have been found in domestic contexts in the archaeological site of Madâ'in Sâlih (Saudi Arabia), dating from at least the 2nd century BCE until the 7th century AD. These have been identified based on the anatomy of the fibrous vascular bundles (Bouchaudl et al. 2011; Fig. 7). Additionally, phytolith studies have allowed to~~

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Ethnobotanical uses of *C. humilis* are more limited, focusing mostly on gardening and landscaping, serving as a decorative element or as a soil retainer (González-Benito et al. 2006). Leaves can be plaited into baskets (Peña-Chocarro et al. 2015). The palm occasionally has dietary purposes, with the fruits being eaten in Morocco, the heart (palmito) being consumed in Spain, and the young suckers being cooked in Italy (Haynes and McLaughlin 2000). The roots are believed to be aphrodisiac (Abderrahim et al. 2013). The archaeobotanical and historical attestations of *C. humilis* reflect its present distribution, being restricted to the coasts of the Western Mediterranean. Stones of the Mediterranean dwarf palm were found in the Iberian Peninsula in the Iron Age site of Huelva (Pérez-Jordà et al. 2017), in the 6th millennium BCE site of Cova de les Cendres (Alicante) and in Morocco (Peña-Chocarro et al. 2015). Remains of the Mediterranean dwarf palm were also found in Early Neolithic sites of São Pedro de Canaferrim and Lapiás das Lameiras in Sintra, Portugal (López-Dóriga 2018). Charcoal fragments dating to the 1st century AD were retrieved in a garden of a rich domus in the ancient Roman town of

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[Fig. 8 near here]

Although both palm fruits roughly fit the description, we are confident in identifying the specimen from Tell es-Sultan as *N. ritchiana*. Firstly, this is motivated by Mazari palm fruits being more round than the ones of the Mediterranean dwarf palm, as can be observed by comparing the specimen of *C. humilis* from two Italian *herbaria*, *Herbarium Cesatianum* stored at the Sapienza University of Rome Herbarium (RO; Fig. 5; Millozza and Giovi 2008) and *Herbarium Universitatis Florentinae* in Florence, with the digitized herbarium sample of *N. ritchiana* from the Royal Botanic Garden of Edinburg (E; Fig. 6).

Secondly, *N. ritchiana* has more ethnobotanical and medicinal uses than *C. humilis*, with the fruits of the former being also being consumed for their laxative and purgative properties. Finally, in terms of archaeobotanical attestations of the Mazari palm, the site of Madâ'in Sâlih (Saudi Arabia), ca. 600 km away from Tell es-Sultan, falls outside of the present distribution area of *N. ritchiana*. Such find appears to be even more striking when put in contrast with the remaining archaeobotanical attestations of the palm, which are all located within a radius of less

than 500 km from each other, but 3000 km away from Madâ'in Sâlih. Although much more recent (2nd century BCE - 7th century AD) than the find from Tell es-Sultan, this advances the idea of *N. ritchiana* being exchanged through commercial routes with the Middle East since earlier on. When in come to *C. humilis*, whilst most of its archaeobotanical attestations fall within its present distribution range, the find in the Bozburun Byzantine shipwreck in Turkey also represents an outlier, set at roughly 900 km from the site of Tell es-Sultan. However, it should be considered that the find dates to the 9th century AD, much more recent than the find from Jericho. Additionally, *C. humilis* is there found in the form of fibers used in rope making, therefore not testifying the use of its fruits or of the whole plant.

The iconography of the sacred tree in the Near East

The retrieval of a palm fruit in the small room behind the throne room of the EBA palace of Jericho also proves to be of great interest from an archaeological perspective. The first depictions of palm-like objects in art date back to the 6th – 5th millennia BCE, before the beginning of literacy, being engraved on bones from the sites of Neve-Yam and Hagoshrim in Northern Israel, and interpreted as the portrayal of a tree goddess (Orrelle and Horwitz 2016). More frequent iconographic representations of a sacred palm-like tree date back to as early as 3000 BCE, when Sumerians are supposed to have started date palm cultivation (Nixon 1951), and include depictions on a bronze axe found in Byblos (Nigro 2003). Sacred plants worshipped by priests, kings and even hemi-mythic beings are known from Mesopotamian art (in glyptic of Akkadian, Old-Babylonian, Kassite, Assyrian), and there is evidence in several palaces (from Kish to Mari) of the presence of trees and plants for ornament or symbolic functions.

A development in the iconography of the sacred tree can be noticed around the mid-2nd millennium BCE, under Tukulti-Ninurta I. The motif continues to be seen until the end of the

first millennium, with a great degree of individual variability. Despite of this, it can be summarized as featuring a series of peculiar characteristics. These consist of "a trunk with a palmette crown standing on the stone base and surrounded by a network of horizontal or intersecting lines fringed with palmettes, pinecones, or pomegranates" (Parpola 1993~~, pp. 164~~).

Due to the absence of cuneiform sources expressly mentioning the tree species, scholars have developed several interpretations, without reaching a consensus on its iconography. There are three main interpretations: a) that it represents the "tree of life"; b) a date palm; c) a constructed cult object (Giovino 2007).

~~One of the most famous depictions of the tree scene is shown in carvings from the Northwest Palace of the Assyrian king Ashurnasirpal II (883-859 BCE), which has been thoroughly analysed and discussed (Porter 1993). Two winged figures are depicted, each of them holding a bucket and reaching out with an oval object toward a stylized tree-like object resembling a date palm found between them. The scene is closely related to the figure of the king. The most widely accepted interpretation is that proposed by Edward B. Tylor in 1890, who noted the resemblance of the stylized tree to a date palm and argued that the scene represented the artificial pollination of female date palms with pollen from male flower clusters (Tylor 1890, 386), an agricultural process essential to raising dates (Porter 2003). The practice was codified in the Laws of Hammurabi, dating ca. 1750 BCE (Janick 2005, p. 265-267) and already known from Mari wall paintings of the Palace of Zimri-Lim (Parrot 1958) and a bronze axe found in Byblos (Nigro 2003, p. 22-23). The dioecious nature of palm trees, whose fruit yield can be greatly increased through artificial fertilization, has also caused them to be a common symbol of fertility. Additionally, the act of artificial pollination has also been used as a metaphor for human sexuality in ancient Near Eastern societies, finding a parallel in many ancient myths, including~~

~~the Sumerian sacred marriage between Inanna and Dumuzi celebrated during the Sumerian Akitu Festival (Homan 2002).~~ Although the date palm theory appears to have overpowered the other two, Giovino (2007) believes that the interpretation as a constructed cult object is much more promising. Langdon (1919), observing the Assyrian Sacred Tree (AST) against other Near Eastern examples, noticed that the image of worshippers before the AST was mirrored in their depiction in front of human-form or aniconic representations of gods, such as a spade and wedge, using the same gesture of worship in both cases.

Interestingly, the recovered charred fruit belongs to a different palm species than the one corresponding to the most widely accepted interpretation of iconography. ~~. It is possible that *N. ritchiana*, which is also dioecious, was purposely chosen due to its smaller size in comparison to *Phoenix dactilifera* and could have been more easily grown inside the structure of the palace, being kept as a sacred plant. However, i~~It is ~~also~~ possible that the adoration was not directed specifically to the date palm tree, but rather to a general tree or tree-like object, such as the 8th century BC~~E~~ "artificial tree" evidence found in Neo-Assyrian royal city of Khorsabad during mid-19th century excavations (Giovino 2007). Such evidence is constituted by large pieces of bronze sheathing embossed with the design of palm tree trunk scales or imbrications which had once been nailed to a shaft of cedar 9 m long and 0.5 thick, resulting in a metal encased pole. For this reason, a dwarf palm would have served as a perfect substitute. The small dimensions of *Nannorrhops ritchiana* made it more suitable for cultivation inside the palace or in sacred buildings. An additional prestige might have been given by the fact that the Mazari palm has medical properties and that it must have been imported from further areas. The latter fact also suggests the existence of an overland commercial track to the south-east, across the desert of Saudi Arabia, which only recent excavations and other finds have revealed.

Conclusions

The presence of *Nannorrhops ritchiana* in the area of Jericho represents a novelty as this species does not grow in the area and has not been attested there in the past. It is therefore believed that the fruit could have arrived from the desert areas of either the Southern Arabian Peninsula or the Middle East through a commercial network. The Mazari palm, and in particular its fruits, could have been traded due to its widely attested medical properties. However, the context of retrieval, the room adjacent to the throne room, along with Near Easter iconography, rather suggests a sacred use of *N. ritchiana*.

This helps to backdate the possible use of the dwarf palm as a religious symbol/cult object. Recent finds in the north-western Arabian oases of Qurraya and Tabukm, may antedate direct contacts between the Southern Levant and the Arabian Peninsula to the Early Bronze Age. Connections between Tayma and the Levant are demonstrated for the final stage of the period (Early Bronze Age IVB) and in the following Middle Bronze Age, and accentuated during the Late Bronze Age (LBA), when political and commercial contacts extended to Egypt, the Mediterranean, Assyria and Babylonia (Liu et al. 2015). The establishment of actual trade routes between the southern Arabian Peninsula and the Levant is dated to the LBA, involving the trade of incense and copper (Liu et al. 2015), enriched during the Early Iron Age with the trade of iron (Renzi et al. 2016). Although the cited studies refer to more recent archaeological periods, it is evident that this geographical area represented a fundamental junction point between Mesopotamia and the Eastern Mediterranean. Through the presentation of few, but significant

data, the present study allows to hypothesize contacts with the southern Arabian Peninsula earlier than has been previously suggested, providing a new perspective on Middle Eastern trade routes. The find of further archaeobotanical remains (charcoals, pollen, phytoliths) could help in defining whether the Mazari palm was locally grown or, as appears to be more probable, was just found at Jericho as a result of commercial exchanges. Archaeological issues at the site of Tell es-Sultan could help to shed some light on the issue.

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Figure 1. General map of the Near East, Egypt and Saudi Arabia Peninsula. Main archaeological sites are reported. The underlined names refer to sites quoted in the text.

119x160mm (300 x 300 DPI)

Figure 2. View of the subsidiary room L.1160 with platform L.1168 and light well L.1162 to the north brought to light in the middle terrace of EB III Palace G, from the east. © Sapienza University of Rome ROSEPAJ.

612x465mm (72 x 72 DPI)

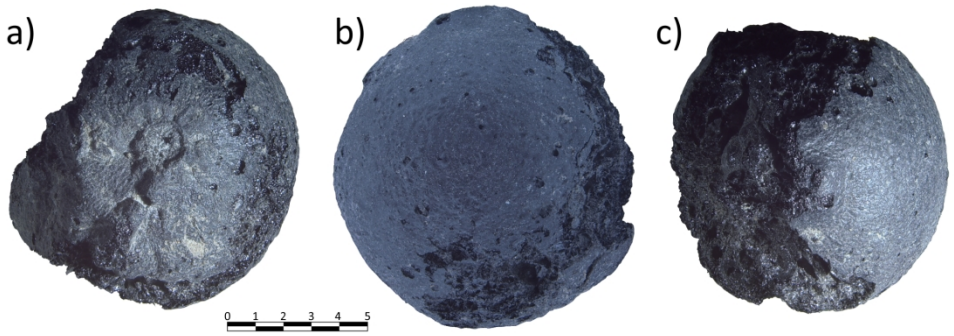

Figure 3. Charred round fruit found in the archaeological site of Tell es-Sultan; a) top view, pedicel scar is visible; b) lateral view; c) bottom view, stigma scar is visible.

181x65mm (300 x 300 DPI)

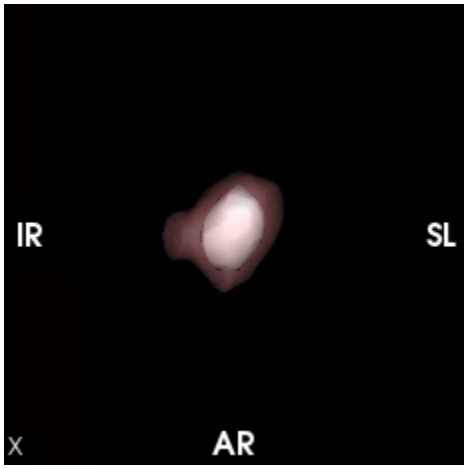

Figure 4. The investigated specimen showing the presence of only one seed inside (CT scan image).

19x19mm (300 x 300 DPI)

Figure 5. (a) Nannorrhops ritchiana (Griff) Aitch. specimen from the Royal Botanical Gardens of Edinburgh Herbarium (E; Miller 1984); (b) close-up of the Nannorrhops ritchiana fruits.

133x318mm (300 x 300 DPI)

Figure 6. (a) Chamaerops humilis L. sample from the Herbarium Cesatianum held at the Museum Herbarium of the Sapienza University of Rome: (i) whole specimen, (ii) detail of the fruits; (b) Chamaerops humilis L. sample from the Herbarium Universitatis Florentinae: (i) whole specimen, (ii) detail of the fruits.

161x189mm (300 x 300 DPI)

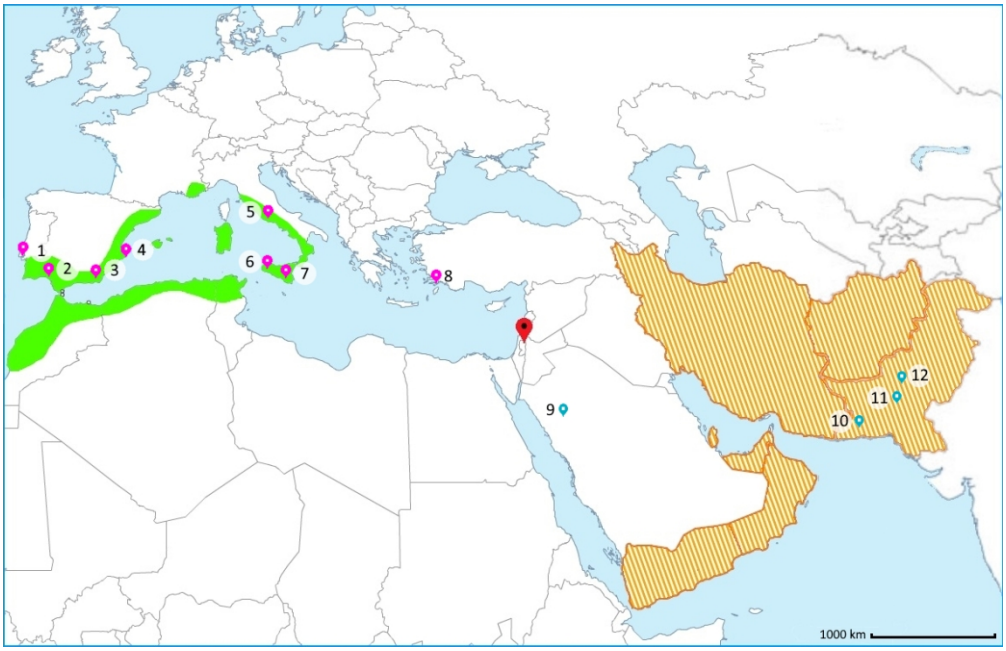

Figure 7. Present distribution map of Chamaerops humilis (green; from Garcia-Castano et al., 2014) and Nannorrhops ritchiana (striped orange; from Palmweb.org). A proper distribution map was not available for the latter, therefore whole countries where the palm is found have been highlighted. The red pin indicates the archaeological site of Tell es-Sultan (Jericho). Pink pins indicate the archaeobotanical findings of C. humilis: 1. São Pedro de Canaferrim and Lapiás das Lameiras in Sintra (charcoal); 2. Huelva (stones); 3. Sierra de Gàdor (pollen); 4. Cova de les Cendres (stones); 5. Priverno (charcoal); 6. Gorgo Basso (pollen); 7. Biviere di Gela (pollen); 8. Bozburun (fibres). Blue pins indicate the archaeological sites where N. ritchiana remains were found: 9. Madâ'in Sâlih (charcoal); 10. Shahi-Tump (endocarps, phytoliths); 11. Sohr Damb (fruits); 12. Miri Qalat (endocarps).