Egyptian Journal of Archaeological and Restoration Studies (*EJARS*)
An international peer-reviewed journal published bi-annually
www.ejars.sohag-univ.edu.eg

Original article

SAFFLOWER IN ANCIENT EGYPT

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Article info.
Article history:
Received: 13-2-2025
Accepted: 7-12-2025
Doi: 10.21608/ejars.2026.511051

Keywords:
Safflower
Dyeing
Funerary Wrappings
Ancient Egypt
Flower bouquets
Garlands

EJARS – Vol. 16 (1) – June 2026: 79-85

Abstract:
Man's relationship with plants has begun since antiquity and developed upon discovering their importance and grew them. This marked the cultural revolution of agriculture and settlement bringing about diverse lifestyles, beliefs, arts, and interactions with environmental elements, among which plants remained a constant yet varied feature across societies. This study explores the significance of safflower (Carthamus tinctorius), in ancient Egypt, where it was highly valued for its versatile uses. The ancient Egyptians utilized safflower primarily, for its yellow and red dyes, which were used to color linen and funerary wrappings. Additionally, oil extracted from its seeds played a role in cosmetics and medicinal treatments. Beyond its practical uses, safflower held deep symbolic meaning, representing renewal and the desire for rebirth. This was evident in its inclusion in wreaths and bouquets placed with the deceased, as well as its presence on the chests of some New Kingdom mummies. The study aims to highlight the plant's role in Egyptian life, particularly in funerary practices, fabric dyeing, and healing purposes. The symbolic association of safflower with resurrection suggests that it was not merely a material resource but also a powerful emblem of the afterlife. Its presence in burial rituals reinforced the belief in eternal life, ensuring the deceased's safe passage and renewal in the underworld. By exa-mining these aspects, this research sheds light on the significance of safflower, *emphasizing its enduring role in both daily life and spiritual traditions of ancient Egypt.*

1. Introduction

1.1. *Botanical characteristics of safflower*

Safflower [1] known as *Carthamus tinctorius* L., belongs to the daisy family (*Asteraceae*) or the composite family (*Compositae*). The term *Carthamus* is derived from the Arabic *qurtum* or *Gurtum*, and it is also referred to as *a'sfar* or "false saffron". In the Arab world, it is called "kurtum", while in India and Pakistan, it is known as "kusum", from the Sanskrit word "kusumbha". The English name is "safflower" [2-4]. Some researchers suggest that safflower originated in the Near East [2,5], appearing as an oil crop in Early Bronze Age sites (3000 BCE) in northern and central Syria [6]. It seemingly spread from there to Egypt, the Aegean, and south-eastern Europe [6-8]. Others propose Asia Minor as its origin, though not excluding India, central Africa [9-12]. It might have spread from Asia to India, North Africa, and Europe [3,13]. Safflower was cultivated for its flowers, used in dyeing, and for its oil-rich seeds, which had medicinal uses. Two types were found in Egypt; wild and man-grown. Today, safflower is also used as animal feed due to its stems' amino acids and minerals [2,4]. The cultivated or wild safflower [7] is an erect and branched herbaceous plant, fig. (1-a), thriving in sandy soils [6,14] and diverse climates [6]. It grows 70-130 cm tall, with spiny, serrated leaves, thick roots with lateral fibers extending 2-3 meters deep. The flower is tubular, ranging in color from orange-red to yellow-orange, fig. (1-a & b), containing two main pigments: yellow carthamidin, water-soluble, and red carthamin, soluble in dilute alkaline solutions such as natron salts [5,15]. Its seeds are dicotyledonous, fig. (1-c), surrounded by involucral bracts for photosynthetic nourishment [7].

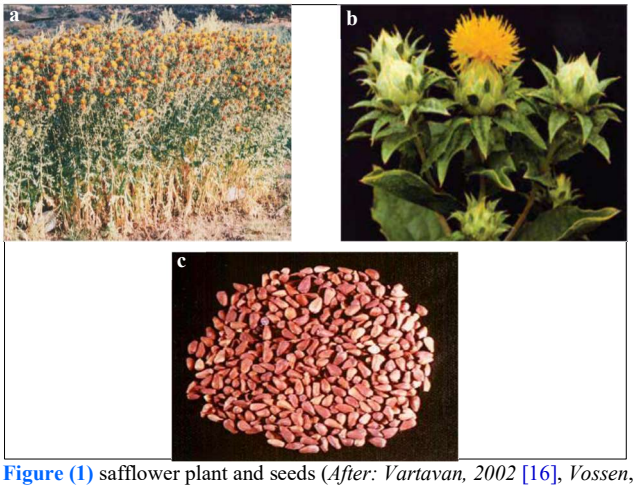
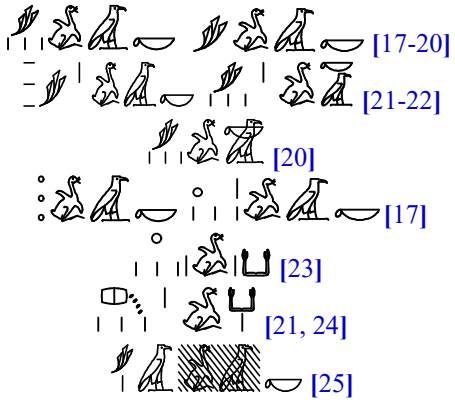


Figure (1) safflower plant and seeds (*After: Vartavan, 2002* [16], *Vossen, & Mkamilo, 2007* [2], *Ma, Yee & Aung, 2019*). [14])

1.2. *Terms for safflower in ancient Egyptian language*

The ancient Egyptians called safflower *kt/kꜣṯ/kꜣtꜣ,* the written forms of this word varied, as confirmed by the following written forms:



Some scholars referred to safflower by other names, including (but not limited to) Loret, who argued that the word *nstj* refers to the safflower plant[(a)]. Woenig also argued that the same meaning is provided by the word [26]. Budge argued that the word: *mꜣt, mꜣt.t* (its writing forms incude: [17,27,28] is safflower plant. He specified two types, one of which grows in the Delta, *mꜣt mḥyt* meaning "Northern Qurtum or Qurtum of the Delta". The other is called: *mꜣt ḫꜣst* meaning "Wild or Desert Qurtum" [17]. There is no consensus regarding the meaning of Qurtum that was given to this word, as the Berlin Dictionary did not define it as a specific plant, but stated that it is a useful plant, found especially in the Delta and on the banks of the river, and in the desert [27], while "Faulkner" defined it as the plant "Mandrake" [28]. The author agrees with Keimer, who confirmed that the ancient Egyptian word for the Qurtum plant is *kꜣṯ* [10,11]; based on the phonetic comp-arison between the ancient Egyptian name and the name known to it today; "*Carthumas*", which is the linguistic synonym of the Arabic word Qurtum or Gortum, as previously mentioned. Determinatives suffixing the various written forms of the word *kꜣṯ* do not provide evidence of a specific definition of this plant, being so general and referring to the concept of the plant such as: , , or they might provide an indication of its abundance such as: , as referred to by the phrase "*ꜣḫt kṯ*" [21,29] "the fields of Qurtum". This appeared on the eastern wall register of the Edfu temple [30], which suggests (despite the mythical nature of the text) the abundance of this plant in ancient Egypt even in the late period of ancient Egyptian history.

2. Methodology

This study is essentially based on textual and physical evidence of safflower use in ancient Egypt. Primary sources include inscriptions, archaeological findings, and chemical analyses of dyed fabrics. The methodology incorporates historical linguistic analysis, botanical analysis, and experimental dye studies.

3. Results

Through the above-mentioned study, some results were extracted ***)** Safflower was cultivated in Egypt and the ancient Near East. ***)** It was used in dyeing linen fabrics and mummy wrappings. ***)** Chemical experiments confirmed that ancient Egyptians understood the dyeing properties of safflower, extracting yellow carthamidin and red carthamin. ***)** Safflower had multiple uses, including medicinal, cosmetics uses, and funerary purposes. ***)** Floral wreaths containing safflower adorned mummies, symbolizing rebirth and renewal in the afterlife.

4. Discussion

4.1. *Uses of safflower*

Safflower (*Carthumas*) was known in ancient Egypt [13] as one of the plant-based dyes used to obtain pink, red, or yellow pigments derived from its flowers for fabric coloring [31-33]. Other degrees were created by mixing these colors or employing various mordants. Evidence of natural dye use in ancient Egypt has been confirmed through three different dyeing techniques[(b)]: **a)** Direct dyeing was applying the dye directly without mordants or metal salts to fix the color. **b)** Mordant dyeing was using chemicals, such as safflower or henna, to fix the dye. Typically, a dye bath was prepared before immersing the thread or fabric. **c)** Double dyeing or over dyeing consisted of more than one dyeing step [34]. Since safflower grew abundantly in Egypt, Lucas suggested that its red pigment was mixed with henna to create an orange-red dye for fabrics [35]. Mummy wrappings in ancient Egypt dis-played diverse colors, such as pure yellow, brownish-yellow, and deep red. Pure yellow was likely dyed with henna leaves, while pale red derived from safflower proved resistant to amino acids and responsive to weak alkaline during experiments [33]. As early as the 18th dynasty [6,36], safflower oil was used medicinally[(c)] and possibly stored in funerary jars found in the tomb of king Tutankhamun [5,33]. Its flowers *ḥrrt kꜣṯ* "safflower flowers [23,29,37,38] were used in eye treatments and cosmetics [13], producing the red pigment for cheeks, palms, or soles. During the 21st dynasty, male mummies or their wrappings were dyed red, while female mummies were dyed yellow [9,10]. Safflower was also used to dye linen during this period [8]. In addition, its flowers were used in decoration to make royal wreaths[(d)]; the ancient Egyptians found in its flower feasting to the eye, so they included it in collars and wreaths during the New Kingdom and the Late Period. It was placed around the necks of the dead. The Egyptians were keen to use flowers that grew in the Egyptian environment, so the plants were usually chosen on the basis of color, scent, shape, or size [13,39]. Ancient Egyptians fashioned necklaces and floral wreaths by folding leaves in half or slicing them into long, thin strips, securing them with papyrus threads or palm fronds. Safflower petals or whole flowers were inserted into pockets formed by the folded leaves, which acted as hooks for attaching the flowers. These arrangements, often semi-circular [15,40], were placed on mummies' heads, necks, or chests. Symbolic floral designs were believed to embody the hope for rebirth, protection, and renewal after

death, ensuring safe passage into the afterlife and making it more likely that they enjoyed given power of resurrection in the netherworld [40].

4.2. *Evidence of safflower use*

4.2.1. Physical evidence

Numerous safflower-dyed mummy wrappings and linens have been discovered, with the oldest examples dating back to the 12th dynasty [41], but the researcher found no older ones. The earliest evidence comes from examining two mummy wrappings from Bersha in that dynasty, where yellow safflower pigment was extracted through boiling water. James Thomson examined multiple mummy fabrics, many dyed with safflower's red pigment. A yellow sample from another mummy showed unmistakable traces of the same plant-based dye [42]. In the 12th dynasty tomb of the "two brothers"[(e)] (Nakht-Ankh and Khnum-Nakht), analysis confirmed their mummy wrappings were dyed with safflower's yellow pigment. Experiments revealed that the dye extracted from Nakht-Ankh's mummy was lighter than that of Khnum-Nakht's, indicating uniform dyeing before application. The fabric had also been pre-treated with mordants, proven by the dye's reaction to boiling water and the addition of salt during dyeing to replicate linen's texture [8,32,42]. Chemical analysis confirmed that red-colored fabrics found in tombs were dyed using safflower flowers. Orange-dyed garments were likely more expensive than yellow-dyed ones, explaining why only two orange-dyed pieces were found among Khnum-Nakht's numerous wrappings [42]. The mummy of king Amenhotep I was wrapped in orange-dyed linen and adorned with wreaths of red, yellow, and blue flowers, including safflower [40]. Similar wreaths were found on another mummy at Dra' Abu el-Naga. The Leiden museum holds an undated wreath containing safflower flowers, evidence that safflower was cultivated in gardens and fields in northern Egypt [10,10,11]. Additional remains of safflower were discovered at Tal Al-Amarna in residential areas (Western Street Foundation: 3/2 Unit 2707) [43]. In tomb (KV63), archaeologists discovered 17 types of plants, ten of which were fashioned into intact, semi-circular floral collars, fig. (2) within coffin (E)[(f)]. Among these, around 1.000 safflower flower heads were recorded for the first time in all the examined collars. These collars were distributed with one placed on the knees and three on the chest inside the coffin, suggesting that safflower might have been cultivated in the area during the use of the tomb [13].

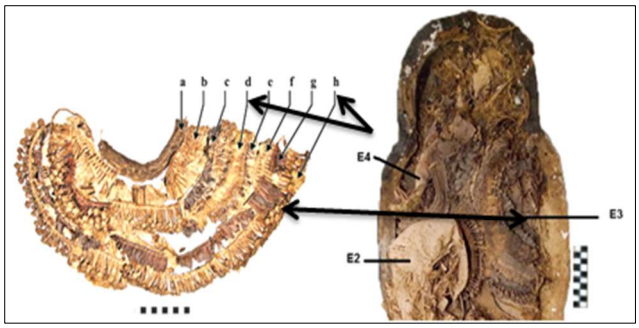


Figure (2) safflower flowers in h & d as components of collar E3, coffin E tomb KV63 (*After: Hamdy & Fahmy, 2018*) [13]. 48 fig. 4, 50 fig. 6 (h, d).

Analyzing the composition of safflower collars, fig. (3-a & b), they consisted of strips or threads made from date palm fibers and pomegranate leaves as supports for the safflower flowers. Both plants held special significance for ancient Egyptians. Date palms symbolized the renewal of life and the passage of time. Their cultivation, tied to lunar months, was associated with time, human life, and the afterlife, particularly in the New Kingdom. They were thought to represent feminine forces [44] and acted as a medium to summon deities from the afterlife back into the living world. Date palm fronds, used as offerings to the deceased, were believed to facilitate their rebirth [45].

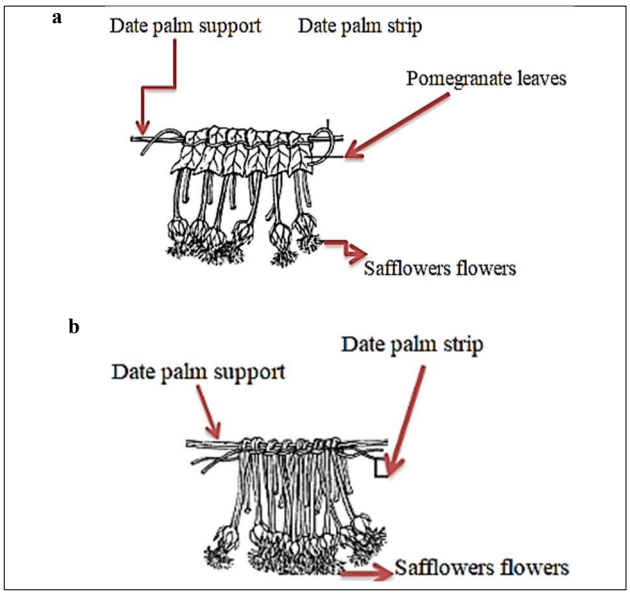


Figure (3) safflowers, one of the rows of the necklace, coffin (E), as detailed from the previous figure; **a.** 49 fig. (5-c), **b.** 50 fig. (6-d & h) (*After: Hamdy & Fahmy, 2018*) [13]

Pomegranate leaves, on the other hand, provided the ancient Egyptians with numerous medicinal benefits. The pomegranate tree was depicted in tombs in various ways, and its fruit was presented in baskets carried by both men and women, symbolizing life and fertility, likely due to the abundance of seeds in the fruit [46,47]. Thus, the threads and strips supporting the safflower flowers symbolized renewal and rebirth for the wearer. Meanwhile, the pomegranate leaves reflected the tree's symbolism of fertility and life. Since its fruit was often carried in baskets by women, and the date palm was linked to femininity, the combination of these elements in the safflower collar conveyed notions of delicacy and beauty. There was a striking similarity between the floral necklaces found in tomb KV63[(g)] and those in the tomb of king Tutankhamun (KV62) [13]. In king Tutankhamun's tomb, over 9.000 well-preserved plant and flower remains from 21 plant families were discovered, including safflower flowers, which are housed in the Egyptian museum under item number (16502), weighing approx. 16.9 grams [13,16,48,49]. This indicates that safflower was not only used for dyeing and adornment but also held symbolic significance. The researcher suggests that the blending of red and yellow in its flowers gave safflower a unique symbolic meaning in floral arrangements

placed on the bodies of the deceased. It likely represented the concept of rebirth. This is supported by the correlation between the colors of the safflower flowers and the red and yellow dyes extracted from them, which were sometimes used interchangeably to symbolize the sun disk. In ancient Egyptian thought, red was associated with the triumph of the sun god Ra, as it rose and set victoriously after its battle against the forces of darkness. The red hue of the sky at sunrise and sunset was seen as a sign of this victory, representing life, but also chaos, a symbol of the god Seth [40,50]. The use of safflower flowers by the ancient Egyptians might thus symbolize the struggle between good and evil, chaos and order. By rejecting evil, justice emerged, and by resisting chaos, life was affirmed.

4.2.2. Textual evidences

Safflower was mentioned in stela CGC 34183 [25], preserved in the Egyptian museum in Cairo, dating back to the reign of king Tutankhamun, where it states:

[25,51,52]

[ḫm] *w.sn wꜣw r mrḥ, ḥpr(.w) m jꜣꜣw, rd(.w) m k* [*ꜣt*]*ꜣ.*
"*Their sacred sites perished and became mounds of rubble, overgrown with safflower plants*" [53,54].

This text suggests that safflower grew in southern Egypt, as it references the destruction of Akhenaten's sanctuaries in the south and the scene of dense safflower growth covering the ruins, obscuring them from view. The writer may have used this imagery to depict the obliteration of these sacred sites, consistent with the plant's physical traits—its height ranges from 70 to 130 cm, with erect and branching stems, fig. (1). This implies that safflower, in addition to being cultivated, also grew wild. Its choice as the covering plant for these sacred ruins could reflect a symbolic reverence, as no other plant was selected for this description. In king Horemheb's legislation, there is a warning against the confiscation or seizure of safflower crops, which states:

|[21]*… ir.tw* |[22] *ḥp r.f … m-mitt wnn nᶜ-n idnw n ᶜt ḥknw pr ᶜꜣ ᶜnḫ.w wḏꜣ.w snb.w ḥr šmt ḥr kfᶜ m pꜣ dmi r* [*k*]*tꜣ /// |*[23] *ḥr hrw 6 ḥr hrw 7…*[*iw.tw*] |[24] *r sḏm r-ḏd st ḥr kfᶜ r tꜣ kꜣt….*
"|[21]*... The law will* |[22] *be applied if the offering department officials of Pharaoh (life, prosperity, health) go to the village to seize safflower///* [23]*| for six or seven days* [24]*| ... where it is heard that they take the safflower*" [36,55].

This suggests that seizing safflower crops was an illegal act equivalent to theft, often perpetrated by senior officials or soldiers as depicted by Gardener [29]. Laws were established to curb such acts by people in positions of power. The warning reflects the importance of the safflower crop to the ancient Egyptians, as it played a significant role in their lives. In a love song from Deir al-Medina[(h)], safflower is mentioned as part of a lover's wish: the lover wished his beloved would have been like connected roses in a wreath:

[56]

"…ḫnr n.i snt.i m mnt mi wꜣḏwꜣḏ mꜣḥ…|[23] *isy šwy pꜣ kꜣtꜣ*
"If only my sister (my beloved) were to me every day like the vine [57] *(organized) in a wreath, and the dried reeds and safflowers"* [58].

The flowers, including safflower, reflect their value to ancient Egyptians, symbolizing connection and affection, as seen in their inclusion in the lover's metaphorical wreath. Safflower was among the royal offerings granted by king Ramesses III to the temple of the god Atum and to Ra-Horakhty:

[38]

prt kꜣt ḥrr kꜣt ḥkt 23000
"Safflower seeds [i] and flowers: 23,000 heqet" [29]

It was also listed in the inventory from the second year of king Ramesses IX, intended for soldiers sent to support Pharaoh's army against Bedouins attacking Egypt on the Red Sea coast:

[23]

|[10]*r mḥ n.i msdmt ///////* |[11] *ḥnᶜ nhꜣ kꜣmri nhꜣ kt…..*
"...Send me kohl, ivory, and safflower...." [59].

On the 25th day of the 4th month in the 17th year of king Ramesses XI, a letter to his deputy in Kush, Panehesy, requested supplies for craftsmen building a sacred structure. Among these was safflower [59]:

[23]

ḥrr kt ḥrr ḫsbd ḳnw
"...Many safflower flowers and blue 'lapis' flowers to ensure the craftsmen's supply" [59,60].

The texts from Ramesses IX and Ramesses XI highlight the importance of safflower in southern Egypt, indicating it was a significant regional crop. It was likely used for oil extraction to anoint bodies or for medicinal purposes. Inscriptions on the eastern wall of the Edfu temple reference safflower fields:

[30]

|[21]*….ꜣḫwt-kt* (*m*)*-bꜣḥ Ḥr Bḥdtj*
"...Safflower fields before Horus of Behdet in the east" [30].
The description of safflower fields suggests its extensive cultivation during this period, particularly in southern

Egypt, where the temple is located. This indicates the plant's continued importance in Egypt's history.

5. Conclusion

Ancient Egyptians, like other ancient societies, recognized safflower's importance long before the modern rediscovery of its economic and medicinal benefits. The ancient Egyptians called Safflower kt, k3t3, and k3t. The researcher believes that the ancient Egyptians used the word kt to denote this plant because it is the closest derivation to the word "Carthumas", the linguistic synonym for the word "Qurtum" or "Gurtum" in the Arabic language. The safflower plant varied in ancient Egypt between wild and cultivated, especially in southern Egypt according to textual evidence. The red and yellow colors were extracted from its flowers to be used in dyeing linen fabrics and mummies' bandages. Laboratory experiments have proven that the ancient Egyptians knew the properties of dyes extracted from the petals of safflower flowers, the yellow dye Carthamidin, soluble in water, and the red dye Carthamin, soluble in alkalis, and used chemical solutions to fix them. Functional multiplicity was a general principle in ancient societies, so safflower was used for various purposes, such as dyeing, medical uses, making cosmetics and ornaments, and for funerary purposes. Safflower flowers were one of the elements of bouquets and wreaths that adorned the chests of mummies, which reflected the symbolic power of their features and colors, ensuring resurrection and renewal of life for the dead in the afterlife. The lack of evidence dating back to the Old k0ingdom does not mean that safflower was not known for it, as it was used in the Middle Kingdom according to the evidence. Texts indicated the prevalence of its use in the New Kingdom and beyond, which reflects the importance of this plant in the life of the ancient Egyptians across different historical periods.

6. Endnotes

(a) Loret mentioned that this word appeared in column number (336) in the pyramid of King "Teti" [40, 60].

(b) Researcher Hanaa A. Al-Gaoudi conducted laboratory experiments aiming at identifying the differences between two important techniques for coloring and decorating textiles in ancient Egypt, namely dyeing and painting, and their effects on the morphology of archaeological textiles. In her study, she prepared experimental samples of linen textiles that were dyed and coated with some common dyes and natural dyes used in ancient Egypt; to obtain samples that were as similar as possible to archaeological samples. The samples were studied and investigated using scanning electron microscopy coupled with EDX unit (SEM-EDX) and ultraviolet-visible microscopy (UV-VIS). After using the methods referred to in the research in the laboratory, it was concluded that these dyeing methods act as a protective role as they protect the morphology of flax fibers from deterioration caused by thermal aging, and natural dyes protect and reduce the deterioration of the surface morphology of flax fibers [33].

(c) Safflower is used among the Egyptians and in folk medicine for skin diseases, stomach ailments, or menstrual problems, suggesting that it may have been used extensively in the Pharaonic period [3].

(d) There are three forms of wreaths in ancient Egypt: necklaces or collars, head wreaths, and bouquets [60].

(e) About eight miles south of Asyut lie the tombs of Deir rifeh, the cemetery of the ancient city of Shashotp, known to the Romans as Hypselis and now known as Shatab. Its local god was Khnum. On the edge of Deir rifeh lie the tombs of the twelfth dynasty, one of whose tombs to the south was the Tomb of the two brothers, dated to that period by its artistic style. Inside the tomb were found two coffins side by side, one for Khnum-Nakht, who bore the title of "*Priest of W'b*", and his brother Nakht-Ankh. The inscriptions in the tomb indicate that they were the sons of the lady Khnum-ʿ3, who may have been married to two men, one of whom, Khnum-Nakht's father, appears to have been Nubian in origin [61].

(f) The coffin was divided from the inside according to the distribution of the necklaces on the body E1 on the knee, E2, E3, E4 distributed on the chest, E5, E6 the rest of the body area [13].

(g) Opinions concluded that (KV63) was initially designed as a tomb, but was eventually used as a room for mummifying, decorating and preparing royal bodies for official burial. This was supported by the archaeological botanical evidence found in the tomb, which morphological examination showed a great diversity of plant materials, including wild and cultivated local and non-local plants. In addition, the presence of a large quantity of safflower and pomegranate in (KV63) indicates that this room was also used for mummification during the Late period or the Third Intermediate period of ancient Egypt, during which time these two types of plants flourished [13].

(h) A hieratic text was found written on the remains of a broken amphora, one of whose fragments still had the handle, the original text of which had been partially erased, and above it love poems were written of a man's declarations to his beloved on the river bank. The vase was grey in colour and consisted of 31 fragments, two of which were bought in Luxor, glued together and placed in the Cairo museum under the number "25218", the rest were found in 1949, 1951 in the great well at Deir el-Medina, six of which were joined to the other two [55,62].

(i) Hassan translated it as "fruit of Katha", while Gardner translated it as "seeds" [28,63].

Acknowledgement

I would like to express my gratitude to Prof. Abd El Moneem Megahed for his valuable remarks and for reviewing this paper.

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