MedCrave
Step into the World of Research
Journal of Textile Engineering & Fashion Technology

Mini Review
Open Access
CrossMark

Crocuses dyes in ancient Mediterranean World

Abstract

In this study we look at some of the different plants that produce the colours of saffron: yellow and red-orange. These autochthonous plants of the Mediterranean regions, such as saffron, safflower, reseda, celandine, etc., are described in ancient written sources as P.Holm. and P.XLeid. for dye wool in yellow imitating the gold colour, the solar star colour (symbol of power) or the fire colour. crocuses colours highly appreciated in ancient times for their symbolic and ritual connotations.

Some of the prescribed preparations at written sources quoted above will be seen and analysed here. Likewise, we will verify the influence of the cultural geographic territory and the tradition of dyes use a certain plant or another in a certain culture, since early ancient times.

Keywords: yellow, gold, saffron dyes, yellow dyes

Volume 8 Issue 1 - 2022

M Julia Martínez García
Independent Scholar, External Research in Project UVEG, University of Valencia, Spain

Correspondence: M Julia Martínez García, PhD in History, Independent Scholar, External Research in Project UVEG: Textiles and Dyes in the field of Ancient Dress:Written Sources and Experimentation (I.P. Prof. Dra. C. Alfaro Giner), University of Valencia, Spain, Email m.julia.martinez@uv.es

Received: January 21, 2022 | **Published:** February 24, 2022

Introduction

Metals such as gold were a source of profit for those artisans or alchemists who tried to make a counterfeit of these following the prescriptions of the recipes present in the Greek alchemical documents. Textile dyes obtained with these techniques, using vegetable raw materials, were an important means of economic survival for artisanal dyers in the Greco-Roman period of Egypt, around the 3rd-5th centuries AD.

We must remember that this was a very critical moment for the Roman Empire, which began its true decline until it led to the end of the Western Roman Empire. Status symbols such as Samite textiles and Persian costumes made of purple silks and true gold fibres were imitated with cheap and readily available raw materials.

Since Hellenistic times these symbols also begin to become external signs of wealth for the new enriched "middle classes", such as *libertos*.[1] However, in the low imperial age these imitations will reach very high levels. These substitutes became an external sign of wealth for a "middle class" trapped in their curial positions, and, in turn, a way of distinguishing themselves from the plebs who could not even claim to own these false silk fabrics that were dyed in golden yellow with vegetable dyes and with false vegetable purples.[2–6]

Historical aspects of yellow colour

The strange history of yellow in the human mind, and its vicissitudes, throughout history, are full of interest for us. The special emotional tone for yellow is by no means easy to define. This varies from a remarkable degree in different historical periods, in different regions of the world and even in civilized conditions. So, among primitive peoples the delight in yellow appears to be almost universal. When ancient peoples knew the dyes, bright yellow, after of purple was the favourite colour. Neolithic's humans used yellow and red ochre to adorn her face and body. Ancient peoples appear to have felt a special attraction for these two favourite colours: red and yellow, which they interpreted as the two colours of gold, the most precious material of their ornamentations. Throughout most of Asia, ancient and modern, in Assyria, India and Ceylon, yellow was often the supreme and most sacred colour.[7] In India and Ceylon yellow is the colour preferred, either for flowers or clothing, and substances that produce yellow dyes are admired and are essential in the rituals of many ceremonies. For example, in Hindu marriage ceremonial, turmeric is always necessary.[8] Turmeric (Figure 1) is in India the substitute for saffron (Figure 2) used in the matrimonial rites proper to Greeks and Romans in the ancient Mediterranean. These plants were perhaps related to solar consecration, as turmeric appears to be in India today. In Persia the saffron possessed magical qualities and even in medieval Europe was used in small bags. *Soma* is a golden colour and is still used as a yellow dye Persian.[1] In Persia, yellow is a favourite colour, as it was for the Hebrews, because in the Song of Songs, the wife,[9] is compared to the saffron. In ancient Egypt, though yellow was not the supreme colour, it was still held high honour. Likewise, the preferred combination of expressing splendour was gold and lapis lazuli.[10]

Although in the classical world it did not occupy the sacred position that always had in Asia, was nevertheless a preferred colour. It is always mentioned with an affective tone of pleasure. In Greece and Rome, although red was the most sacred colour, yellow was the colour of festive dresses for women and children and, as Pliny tells us, was especially worn by women in marriage. It was also the colour of the priests of Cybele. Red and yellow, according to the same author, were the colours that prevailed in the old portraits. The four primary colours, according to Empedocles, are white, black, red and yellow. For the ancients it was a colour of joyfulness, the colour of the sun, gold, honey and amber. Clearly, with the advent of Christianity a new sensitivity was introduced as far as yellow is concerned. Which leads, as Magnus has pointed out,[5,6,11] to a preference for the dark end of the spectrum. To a large extent, no doubt, this was nothing but the result of the totality of Christian aversion against the classical world and the rejection of everything symbolic viewpoints as symbol of joyfulness, fortune and luxury. Christianity experienced an instinctive repulsion towards the bright colours associated with pagan rituals and societies. Yellow became the colour of jealousy, envy, and betrayal. Judas was painted in yellow robes and in some countries the Jews were dressed in yellow robes.

[1]Soma is a great deity, cosmic power and spiritual principle in Vedic thought. It also had its counterpart in the plant kingdom. There has been a long search for the identity of the original Soma plant was and several plants have been proposed as representing it. Soma was also connected to the practice of alchemy and as early as the *Rig Veda,* it was prepared with gold and possibly lapis lazuli, perhaps even with seashells or pearls.

Figure 1 *Curcuma longa* L. roots (photo: M. J. Martínez García).

Figure 2 *Crocus* sativus L., D.O. Spain (photo: M. J. Martínez García).

Relationship dyes "crocuses" and gold in ancient mediterranean world

In ancient times, there was a tendency to emphasize partnerships with yellow gold or amber. Materials considered expensive and sumptuous in ancient societies. There was, therefore, a tendency to insist that the colour of any beautiful and desirable object is yellow. Colour was as much as the preciousness of the desirable metal. The Ancient Mediterranean societies were, as we know, great worshipper the solar system, hence they held in special estimation plants, which yield a golden-yellow dye resembling sunlight and attributed to them protective and auspicious properties.[8]

According to the dictionary of use of Spanish language the term "yellow" colour applies: "to the colour that is third in the spectrum, which is for example, that of the lemon peel, and to the things that have it." It is equivalent to "gualda" (*Reseda luteola* L.), and is also applied to saffron, safflower and turmeric.[8] This equivalence it corresponds to establish in Greek and Latin terminology. The terminology of yellow, in Greek and Latin languages, is very extensive. We are interested, mainly, those terms that associate this colour with the gold, χρυσός, or with the shine of this metal. This association has reached our days and in most modern lexicographic definition gold is associated with this colour. Covarrubias said of the yellow: "it is the colour that wants to imitate to the cushioned gold", definition in agreement with the one of the modern authors, although some like Baran also associate this colour to the one of the broom flowers, straw and the honey colour, while others propose as reference object for this colour the solar disk.[12]

Some Greek terms for the yellow colour are used to refer to the brightness attributed to this colour. Currently, relate to the sun's brightness, flame brightness or the brightness of some yellow mineral, such as gold, zinc, or amber. All of them raw materials that end up forming part of ornamentations, jewels and other objects of luxury that only a part of the society could acquire, increasing in this way their value as objects representative of high social status. Raw materials and colours that were tried to imitate in the Antiquity to obtain substitutes and falsifications that apparently simulate the greatness and the appearance of these materials. Many remains of ancient textiles yellow dyeing have survived. The intention of some silks dyed yellow was to imitate the gold threads of the most luxurious clothes, such as those present in silks of Sassanid origin. The numerous recipes described in the technical papyri and other treatises of Greek alchemy from Late Antiquity are an example of it.[5,6]

Concerning to Latin term *aureus* a first means that which is made with gold, with raw material is gold, or just any textile, leather or object is covered with gold or whose outward appearance is that of gold.

The definition of the term gold in the lexicon of the alchemists explains different types of matter: white gold, dry and yellow gold, and other materials such as pyrite, cadmium and sulphur with the aid of which solid dyestuffs were manufactured. Gold was also defined as "every fragment of yellow leaves, divided and brought to perfection." Cheap gold were the gildings that served to dye some jewellery yellow for the Greek alchemist of Alexandria and contemporary goldsmiths to writers of P.XLeid. and P.Holm., and any gold object on the surface. In conclusion, any matter of the colour of natural gold or artificially dyed of this colour.[5,6] Papyrus and other technical treatises of this time are often rich in recipes for making gold or for gilding, but also find recipes for dyer wool of the yellow colours and gold colour. The appearance of the clothes made with gold threads could be principal objective of this practice, recalling the expensive and more typical cloths of the ancient patricians, and of Roman imperial dignity (Figure 3).[5,6]

Figure 3 Empress Theodora cortege, Church of San Vitale, Ravenna (photo: M. J. Martínez García, 2009).

Vegetable raw materials useful for dyeing in yellow gold

Generally, for dyeing or colouring the wool in yellow gold, to imitation of authentic gold threads, the papyruses prescribe inorganic

pigments like the *lithargirius*, such as indicated at recipe of P.XLeid. 35.[5,6] In the cited Egyptian sources, we also have some prescribed recipes for colouring different objects such as glass and stones, or for making gold ink, which can be applied to the dyeing of textile fibres. These include raw materials such as saffron, celandine or safflower.[5,6] Dyeing tradition the wool or silk with some intention of giving the cloth an appearance like textiles woven with genuine gold threads, is not unique to Egypt and was also preserved in Syria and part of Arabia. In M. Tilke book is preserved an example of this false "aba" belonging to the Wilh Gentz collection.[13]

Saffron (*Crocus sativus* L.) Fam. Iridaceae

The plant crocus: *Crocus sativus* L. grows wild in Greece, Asia Minor and Egypt, but was extensively cultivated in Italy (Abruzzi and Sicily), Palestine, Syria and Cilicia. Strabo and Ptolemy argument that the best saffron is grown at the mouth of Calycadnus in Cilicia: κρόκος κιλίκιος.

Saffron is a direct dye. Previous mordanting of the fibres is not necessary. The dyestuff is a carotenoid called crocetin found on the stigmas of the flower. Saffron dyed tissues could have a colour between yellow and reddish. Ancient inhabitants of Crete Island used this dye at Minoan and Mycenaean period, because this plant there grew wild at country Greek. Harvesting of wild saffron by young women is attested in a painted mural from Akrotiri palace (Figure 4). Phoenician society dyed their cloths with saffron and offered them to Syrian king Ashurbanipal as part of their tribute. This was a dye highly prized in antiquity. However, there are few analytical data to support use in tissues. Possibly, it was a dye little solid.

Figure 4 Fragment of wall-painting with crocus plant, *Akrotiri*, 17th c. BC, Ref. 267, Archaeological Museum (photo: M. J. Martínez García, 2015).

Perhaps, use in the dyeing of cloths, should be quite low and appreciation could be more a matter of cultural and cultic type, related to mythological stories, about their use in the garments of goddesses, such as Artemis, and the rites that was always linked this plant. However, the Greeks alchemists in some of their recipes prescribed saffron tinctures to imitate the colour of gold leaf gilding silver and copper. According to R. Halleux,[14] and some recipes presents in Democrito of Abdera book: *De Physica et Mystica* (Natural Questions), we can corroborate the use of Cilicia saffron at dyes mixtures. For example, the next recipe, N. 17, prescribed the saffron dye for a liquor preparation that golden colour useful by dyer all surfaces[15]:

Take the saffron from Cilicia, dissolve the saffron flowers in the wine prescribed for this use, and make a liqueur at ordinary way. Immerse the silver there in leaves until it acquires the desired colour. If you use a copper foil it will be better. To purify copper, take aristolochia, two parts; Saffron and celandine, a double dose (...) you will be surprised at the result.

Some Egyptian sources dated around III-IV century AC have recipes intended to colour some objects such as stone or metals, which can be applied to dyed textile fibres (Figure 5 and Figure 6). In these recipes, vegetable raw materials such as saffron or safflower they prescribed. An example of this type would PXLeid. 39.[5,6]

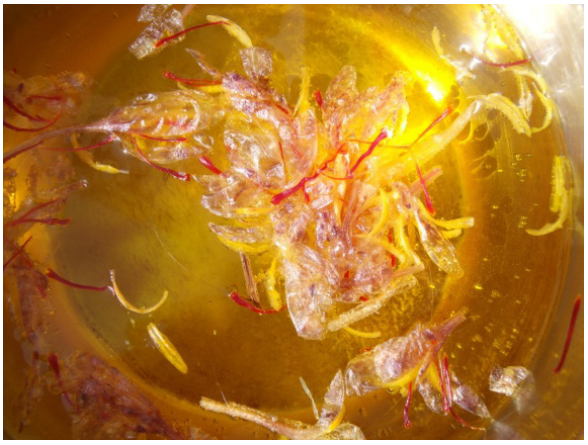

Figure 5 Author's experimentation to dye with a bath of saffron stigmas (photo. M. J. Martínez García).

Figure 6 Wool dyed with Saffron stigmas (photo: M. J. Martínez García).

Safflower (*Carthamus tinctorum* L.) Fam. Asteraceae:

The Carthamus or safflower is a plant that is mentioned in the earliest writings.[16] Theophrastus describes that there are two species: wild and domestic. Dioscórides (*de mat. med*. IV, 188) makes a good description of this plant, as it was a sort of those used to adulterate or substitute for saffron.

The process of obtaining the dye is not easy, since the colorants are not free, but in the form of glycosides, so you must first use an alkali and after an acid. According to Font y Quer description about the preparation of red dye, he speaks of the traditional use of ashes to get the basic medium. The process is basically a maceration of safflower flowers in hot water with ash. Let stand until it forms a red "liquor" called red safflower.[17] Likewise, he said: *it traded with flowers of this plant for the art of dyeing, as well dyed pink silks, feathers and other genres.*

The etymological relationship between the Greek κνῆκός, yellow, κρῆχος and ka-na-ko (Lineal B), as with other Indo-European words and the Sanskrit *kāncaná* such as meaning golden yellow, show that this unstable yellow dye could be used by Greeks and Egyptians from very early period to dye textiles and yarns in yellow gold.[5,6]

118. To produce a gold color by cold dyeing

Take safflower blossom and oxeye, crush them together and lay them in water. Put the wool in and sprinkle with water. Lift the wool out, expose it to the air, and use it.[18]

We have another recipe at P.Iand. 85 (P. 212) attesting use safflower red dyeing as between the components of the mixtures takes cinnabar and hematite, both pigments of red colour. The recipe is very incomplete and has omissions, it says: *(...) Cinnabar (...) hematite (...) safflower 2 parts (...) ¼ part as (...) use*.[2]

Celidonia (*Thapsia garganica* L.) Fam. Apiaceae:

The term Celandine refers to a yellow dye plant, considered very expensive in ancient times. It is very common in the Mediterranean coast the species *Thapsia villosa* L. and *Thapsia garganica* L. a umbellifer whose flowers resemble mustard and woad.

Salmasius mentions that the minor Greek authors pointed out that the celandine conferring colour *lutum* (*Reseda luteola* L.): *ad colorem conficiendum luteum*. Following the indications of Paulus of Egina, this plant, χελιδόνιον or ἑλύδριον would be known as *Thapsia* or *Thapsus*, which emphasizes the property of dyed yellow gold to the manes and wool. Vilanova asserted that the species *Thapsia garganica* L., which is typical of North Africa and Egypt, was used to dye textiles yellow. Perhaps this plant was prescribed at Greeks papyri recipes for dyeing in gold colour, and called *elydrio*:

139. Dyeing of colors

By celandine one means a plant root. It dyes (a) gold color by cold dyeing. Celandine is costly, however. You should accordingly use the root of the pomegranate tree and it will act the same. And if wolf's milk is boiled and dried it produces yellow. If, however, a little verdigris is mixed with it, it produces green; and safflower blossom likewise.[18]

Thapsia garganica L. contains in its composition, among other compounds, a sesquiterpene and carphene, colouring substances potentially also an aromatic sulphated essence and isovalerique acid.[17] This plant is called "deadly carrot" it is poisonous, but research is done to use a substance derived from the plant - thapsigargin - for cancer treatment.[5,6]

Isparag Euforbia spp. Fam. Euphorbiaceae

Euphorbia is a raw material appearing cited in some papyri and has also been detected in a small number of analyses made textiles remains of Coptic period.

Euphorbias have been used for dyeing in the area of Anatolia, now Turkey; hence its name comes *Isparag* (Figure 7 and Figure 8). We know of a textile from the necropolis of *Akhim* dated around s. VII-VIII. It is a silk a Samito preserved at Katoen Natie collection, that seems to imitate both the manufacture and disposal of decorations and colours, the Persians more expensive textiles. According to recommendation from P.Holm. 145[14,17] Euphorbia spp. is a cheaper substitute of celandine for golden colour dyeing.

[2]P.Iand. 85 (P. 212)

Figure 7 *Isparag* or Euphorbia sp. Valencia (Spain) (photo: M. J. Martínez García).

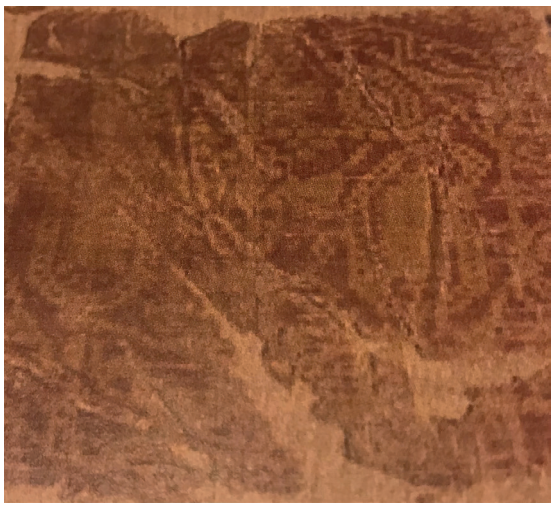

Figure 8 Textile dyed with *Isparag*, KTN col., Ambers, inv. 842 (photo: H. Maertens).

These vegetable raw materials second-class, or if preferred, easier to obtain for artisans' dye, they could be used in some provinces of the Roman Empire. His presence in Egyptian writings suggests that there must have been a tradition of deeply rooted use in these territories. For example, the *isparag*, continued to be used until the introduction of synthetic dyes for dyeing wool carpets and tapestries Turkish.[5,6]

Lutum (*Reseda luteola* L.) Fam. Resedace

The most important vegetable source yellow in antiquity at West Europe was *Reseda luteola* L. The Reseda is a biennial plant that grows wild in most of Europe but is native to south-eastern Europe. This plant was used to obtain the yellow dye in Europe until the discovery of America; because its colour is not easily altered and can be applied both wool fibres and cotton plant how to silk.[19]

The Romans called *lutum: croceum lutum herba est ut*, it is a word of uncertain origin, Virgil called herba *lutea*. The term *luteus, luteum* and *luteolus* refer to yellow. The Greek word for *lutum* is λακὸν, and the German name given to the plant is Wau. The relationship between Indo-European, Latin and West Germanic, shows that the plant itself has a long history, in their name. The Reseda was traditionally used in Rome to dye yellow dresses, as it provides saffron yellow wool, as Virgil calls it: saffroning-gualda (*croceum lutum*). Especially they dyed her dresses vestal virgins.

Yellow-brown tones appear in Coptic textiles from Egypt, in the rosettes sewn into the tunics. These gallons replace the classic decoration with gobelins. Some textiles from Spanish collections test positive for luteolin in tests for yellow, as well as for green. These results show us that textiles dyed with reseda were very common in Egypt. Generally, to obtain yellow Coptic textiles, reseda, safflower stigmas and *Punica granatum* L.;[20] reseda is a plant being shown in greater proportion of analytical. But, it should be noted that in the Greek papyri such as P.Holm. and P.XLeid., this raw material is not prescribed in any recipe.[5,6] Only Pliny mentions the colouring power of *Reseda luteola* L. (Plin. *NH*, XXXIII, 26).[21]

Dye extraction can be accomplished with a simple decoction of the parts containing a higher amount of dye in hot water Figure 9 and Figure 10, as luteolin is soluble in it. It is also soluble in acetic acid and ethyl alcohol.

Figure 9 Experimentation with *Reseda luteola* L.,Yellow dyed wool at Pompei, International DressID Project/CNRS (photo: M. J. Martínez García).

Figure 10 Dyeing with *Reseda luteola* L., Botanic Garden, University of Valencia (photo: M. J. Martínez García).

Conclusion

To summarize, the raw materials that were used to dyed symbolic or rituals dresses such as of the Artemis virgins Osas or make gold substitutes were very varied according to the data revealed by the papyri. However, the reality given by the data from the analyses carried out on the textile remains of Roman Egypt does not indicate this; on the contrary, these corroborate the use of raw materials known and used since ancient times. In the elaboration of the substitutes of gold colour, the raw materials linked since ancient times to the dyeing tradition of each area were basically used.

In each imperial province the dyes continued to be made with native raw materials best known for their traditional use. For example, in Egypt was used *Reseda luteola* L., *Carthamus tinctorius* L., *Thapsia garganica* L., etc., in Syria *Crocus sativus* L. and Persian berries, in Israel *Crocus sativus* L., in Greece *Crocus sativus* L. too, and at Italian Peninsula and Hispania, basically, the *Reseda luteola* L.; Now, the geographical breadth of the Roman Empire and its relations with India allowed the exchange of knowledge, the entry of products from these territories to different parts of the empire, such as turmeric (*Curcuma longa* L.).

Acknowledgments

I would like to express my gratitude to the editorial committee of the *Journal of Textiles Engineering & Fashion Technology*. The research was made possible thanks to the support of UVEG Project: *Textiles and Dyes in the field of Ancient Dress: Written Sources and Experimentation* (dir. Prof. C. Alfaro Giner) (2015- 2022) and the International DressID Project: *Clothing and identities. New perspectives on textiles in the Roman Empire* (Culture Program 2007-2012, European Commission).

Funding

None.

Conflicts of interest

Authors declare that there is no conflict of interest.

References

1. Rostovtzeff M. *Social and economic history of the Hellenistic world*. II, Madrid (Oxford); 1967.
2. Reinhold M. On status symbols in the ancient World. *CJ* 64. 1969:300–304.
3. Reinhold M. History of Purple as a Status Symbol in Antiquity. *Latomus* 116, Brussels. 1970.
4. Reinhold M. Usurpation of status and status symbols in the Roman Empire. *Historia: Zeitschrift für Alte Geschichte*. 1971:275–302.
5. Martínez García MJ. *Sucedáneos, adulteraciones y falsificaciones de materias primas tintóreas en la industria textil del Mediterráneo Antiguo: la transmisión de una tradición técnica a través de los papiros del Egipto Romano*. Tesis Doctoral, Col. 55- Historia [1461], Universidad de Valencia; 2014.
6. Martínez García MJ. *Dyes and the "popularization" of luxury in Roman Egypt (Dyes and Luxury popularization at Roman Egypt)*, Col. Aula Magna, McGraw-Hill Interamericana de España S.L., Sevilla; 2022.
7. Von Arnold E. *The color movement, cultural-historical investigations, by Arnold Ewald. 1st department. Gelb. 1ste Hälfte*, Berlín. 1876.
8. Dymock W. The use of turmeric in hindoo ceremonial. *Bombay Anthropological Society Journal.* 1890;2(44):441–448.
9. Gonzalo L, Díaz-Marta A. Some economic and commercial aspects of saffron. *Ensayos: Revista de la Facultad de Educación de Albacete*. 1988;2:223–230.
10. Flinders Petri WM. *Cuentos egipcios*. In: Olañeta JL, editor. Palma de Mallorca; 2002.

11. Magnus H. *The historical development of the color sense*. In: Von Veit, editor. Leipzig. 1877.
12. Marek Baran, Magdalena Szeflika-Baran, Manuel Francisco Romero Oliva. *La vie en rose: Chromatic lexicon in Spanish and French.* Asociación Cultural y Científica Iberoamericana. 2019.
13. Tilke M. *The costume in the Orient.* Ernst Wasmuth, Berlin. 1923.
14. Halleux R. *The Greek Alchemists, I. Leiden Papyrus. Stockholm Papyrus. Recipe Fragments*, Les Bonnes Lettres, Paris; 1981.
15. Berthelot M. *Collection des anciens alchimistes grecs*. Otto Zeller, Osnabrück. 1967.
16. Maniche L. *An ancient Egyptian herbal*. 2nd ed. London: British Museum Press; 2006.
17. Font i Quer P. Plantas medicinales. *El Dioscorides renovado*. Ed. Península, Barcelona; 2008.
18. Caley E. The stockholm papyrus: An English translation with brief notes. *Journal of Chemical Education*. 1927;8:979–1002.
19. Cardon D. *The world of natural dyes*. Ed. Belin, Paris; 2003.
20. Martínez García MJ. Tinctorial plants in the Ibero-Romanesque period: the territory of Saitabi and its environment. *Purpureae Vestes* III, PUV, Valencia. 2011.
21. Bostock J, Riley HT, Friedrich K, et al. Pliny the Elder, *The natural history* Somerville. MA. (Perseus Digital Library, 2006); 1906.