

Article

Traditional Natural Dyeing Materials Used in Greece from the 19th Century Onwards

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Abstract: Textiles and clothing were and still are an important source of culture as well as an indicator of a robust economy and social status. Textile household goods and clothing are important heirlooms, providing valuable information about the standard of living, socio-political events, and cultural influences of the regions from which they originate. This paper presents the preliminary results of a research project dealing with the traditional natural dyes used in Greece for the decoration of garments from the 19th century onwards (from the 19th until the mid-20th century). The research aims to identify and record all the different plants and dyeing techniques used in Greece during this period and also to propose a non-destructive methodology for the study of dyed textiles in order to facilitate their preservation. In this paper, the focus is on the presentation of the classification and identification data of the plants used as the dyeing sources, according to recipes collected in various areas in Greece, as well as the description of their botanical characteristics. The research was based on the study of more than 2000 manuscripts and many interviews with older people who have used these materials. Thus, more than 140 plants have been documented, together with their recipes. The data produced include the phythological characteristics of the plants, as well as the parts of the plant used, the period collected and the areas they were used, together with images of the plants and various details regarding the recipes used in many places around Greece, along with the related documentation. The study also refers to ethics and traditions related to the dyes, the color, or the dyeing procedures used. Woolen samples were prepared based on the data collected in order to investigate how the differences recorded from place to place are reflected in the final result. Through this research, it was possible to identify and replicate some of the non-common recipes which use the Mediterranean strawflower, *Helichrysum stoechas* (L.) Moench, red algae, *Rytiphloea tinctoria* (Clemente) C.Agardh, and the common poppy *Papaver rhoeas* L as dyestuffs.

Keywords: natural dyes; dyeing procedure; old traditional recipes; natural dyes tradition; color superstitions; Greek manuscripts; *Cupressus sempervirens* L.; *Helichrysum stoechas* (L.) Moench; *Rytiphloea tinctoria* (Clemente) C.Agardh



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1. Introduction

This paper is a preliminary report of a PhD thesis dealing with the traditional natural dyes used from the 19th century until the first half of the 20th century in Greece for the decoration of garments. The aim of the research is to record all the different plants, insects, and dyeing techniques used in the past all over Greece for the decoration of traditional costumes, so that in the future it will be possible to build a totally non-destructive methodology based on hyperspectral imaging, fiber optics reflectance spectroscopy, infrared spectroscopy and chromatometry in order to identify natural dyes found in traditional clothing without sampling the objects.

The research is based on the study of written historical sources such as the documenting manuscripts of the National and Kapodistrian University of Athens, henceforth

NKUA (Figure 1) and manuscripts of the Research Center of Greek Folklore of The Athens Academy, henceforth RCGF. These manuscripts are written documentations which were produced from the beginning of the 20th century onwards, and which record practices performed from the 19th century. Each of them refers to a certain place or village of Greece and contains data regarding the ethics, the way of living, and the beliefs of people who lived in the past. The research is also based on interviews taken during fieldwork in various areas of Greece such as Crete, Macedonia, Thrace, and the Ionian islands. The data regarding the dyeing materials used since 19th century, as well as the dyeing techniques, are of utmost importance for preserving this knowledge for the future generations and assisting the preservation of these objects. It is worthy to mention that most previous research concentrates on a few famous dyes used in the Greek region. This is an effort to find all the possible dyestuffs and the authentic recipes used.



Figure 1. Photos of the NKUA manuscripts (photos taken by the authors in the National and Kapodistrian University of Athens, at 2010).

Furthermore, woolen samples were prepared using the dyeing materials and according to the documented recipes to serve the purposes of the research (to examine the result of the dyeing procedure, to create a database of dyed samples, and to create a non-destructive protocol of identification).

Textiles and clothing were and still are an important source of culture as well as an indicator of a robust economy and social status. Textile household goods and clothing are important heirlooms, providing valuable information about the standard of living, socio-political events, and cultural influences of the regions from which they originate.

Clothes were not only used to protect against the weather and external hazards, but it was also a mean of demonstrating power, wealth, and authority [1]. Clothing is influenced by the social conditions of each era, the ways and customs of each place, its geophysical characteristics and trade contacts with other cultures. In the dress code developed in every historical era and in every region, the colors used have a special meaning. Color is an integral part of the clothing of every historical period and every culture [2].

In addition to semiotics, the customs that developed around the color of clothing significantly influenced commerce and science. Human camaraderie was the springboard to develop production and commercial arrangements around clothing and furthermore to develop every scientific field related to clothing-dyeing procedures. Textile dyes/color are among the most important cultural indicators [3].

The development of the art of dyeing is reflected through written manuscripts and historical relics. In Egypt, preserved Greek papyri, the *Papyrus Graecus Holmiensis* and the *Papyrus Leidensis X*, along with methods for converting common stones and metals into precious stones and noble metals, include recipes for dyeing clothes. They emphasize too the importance of dyes, referring to their value as equal to that of precious metals [4,5]. The know-how around the dyeing processes, the dyes and pigments used and their quality, and the semiotics around the dyed garment are some of the factors reflecting the economic-social development of each region.

In Greece, the dyeing techniques in combination with weaving are for the researcher a source that reflects, perhaps more than any other folk art, the self and ethnic awareness of craftsmen. All the important situations of human life such as birth, death, love, passion, and sickness, all the sad or happy moments, are reflected in the color of the garments [6]. Natural awareness is depicted in the motifs and in the combination of the colors used, and through them, influences can be traced from ancient Greek, Roman, and Byzantine cultures [7].

In the past, each discovery was made through much experimentation and many “accidents”. The accidental events, as well as the mistakes, were exploited, providing valuable knowledge [8]. The oldest dyeing techniques were performed with natural pigments. The use of dyes dates to the same period (prehistoric) as the use of mineral pigments. [9]. However, due to the sensitivity of textile fibers, very few archaeological findings have survived until today but modern analytical methods allow the identification of the most important dyeing materials used in antiquity. The dyers’ craft evolved and reached a high level in ancient times, as evidenced by several historical documents [10]. In the most developed ancient Greek cities, this craft possessed a prominent position. The enormous development of the craft in antiquity is evidenced by the great variety in the tones and shades of the ancient fabrics’ colors. In Greece, natural dyes have been replaced by modern synthetic dyes from the middle of the 20th century. The importance of natural dyes in the past can be proved through the way dyers treated the secrets of the dyeing processes [11].

Dyeing was mostly the prerogative of the priesthood or performed by craftsmen who belonged to the king’s social circle. In many cases, the secrets of centuries were lost because craftsmen did not bequeath the secrets of their craft to subsequent generations, either because they did not find successors to pass on their knowledge, or because they did not want to give away their secrets for fear of competition. Information is scattered; some is recorded in manuscripts, while some is possessed by elderly people only, who are dwindling dramatically. Another difficulty is the local dialect, which makes it difficult to identify plant and invertebrate dyes [12].

In recent years, there has been a rising international trend in the utilization of natural dyeing materials in the garment industry [12]. Ecological consciousness has boosted this tendency to turn to natural dyes. This trend is observed internationally in the scientific literature, raw material supply companies, and schools for learning basic dyeing methods and materials [13]. This fact brings to the fore once again forgotten dyeing techniques and materials that modern people could not think of.

2. Materials and Methods

2.1. Gathering Information

As mentioned above, the information related the natural dyes and the dyeing processes in the Greek region was not centralized. Several sources have been used for the collection of all this scattered information. Some of them were found in old books [14,15], others in the manuscripts¹ of the NKUA [16], and the RCGF [17], and the rest from the interviews during the field research.

Within these manuscripts, information and specific details related to dyeing processing and traditions have been found. All this priceless information was processed and classified with respect to the local idioms. More than 2000 different manuscripts were studied and analyzed, containing valuable information from various places in Greece. The major difficulties of this endeavor were the handwriting, the physical condition of some manuscripts and the local idioms of the language.

Botanical dictionaries at this phase proved to be extremely helpful bringing the pieces of the puzzle together [18]. In Greece, different vernacular names (local names) are used for the same plant species in different regions. It is therefore the first time that such a detailed dyeing identification of dye plants and their classification by their botanical name and plant characteristics has been undertaken in Greece.

There are vast levels of latent knowledge amongst the elders, the people who lived in times when natural dyeing was a common procedure, and those who possess the materials and secrets of their collection and application get fewer and fewer every day. Thus, field research was a necessity. During the last decade, visits took place to towns or villages either famous for their natural dyes or because there was information about people who knew the local dyeing stuffs and procedures. Different regions of Greece representing “traditions” of dyeing methodologies such as Athens, Crete, Nauplio, Thessaloniki, Serres, Skyros, Ampelakia, the Ionian islands, Hermioni, Parga, Kavala, Larissa, Kranidi, Euboea, Feneos, Kalavryta, and Cyprus² have been visited. The main objective was to record and classify the different natural dyes and dyeing processes that were used from region to region in order to gather and preserve the know-how of these people [19–22]. Sometimes the older people who were interviewed were extremely cautious and hesitant to give up the information they possessed. It was a time-consuming procedure to visit them, make them feel comfortable, and persuade them to share their precious knowledge. On the other hand, it was like travelling back to time, since they were letting the researcher enter their world. Some of them were willing to give all their knowledge and most of them enjoyed the whole procedure. A total of 30 interviews were performed during the last decade.

2.2. Materials and Dyeing Procedure

After harvesting and processing the raw information, the research focused on specific dyeing materials and the replication of the recipes related to them. This was thought to be necessary for several reasons. One of these is to check the shades mentioned in the recipe. Another is to create a database of dyeing materials, recipes, and samples in order to create a non-destructive method of identification. The replication of specific recipes demands to find all the appropriate dyeing plants and auxiliaries. The first step was to locate and collect the appropriate plants from the countryside or from related shops. Most of them, such as the almond, *Prunus amygdalus* (L.) Batsch, the common myrtle, *Myrtus* L., the sweet chestnut, *Castanea sativa*, Mill plants of the genus *Hibiscus* L., the oriental plane, *Platanus orientalis* L., and the southern blue gum, *Eucalyptus globulus* Labill., were collected from the fields. Others, such as the tea plant, *Camellia sinensis* (L.) Kuntze, the red algae *Rytiphloea tinctoria* (Clemente) C. Agardh, *Quercus* L., and kermes *Kermes vermilio* Planchon, 1864, were bought. The plants, based on the recipes used, should be used either dried or fresh. The textile material used was woolen fabric in its natural form, because this was the material most used in the past for clothing. The instructions given in the recipe were followed in every detail, especially when pre-mordanting or other preparatory procedures were mentioned. For example, different dyeing techniques were performed for the same dyestuff, while an effort was made to replicate recipes using rare and unknown dyestuffs, such as Mediterranean strawflower, *Helichrysum stoechas* (L.) Moench (Figure 2) [23,24]. The result of this experimental procedure is more than 60 dyed samples.

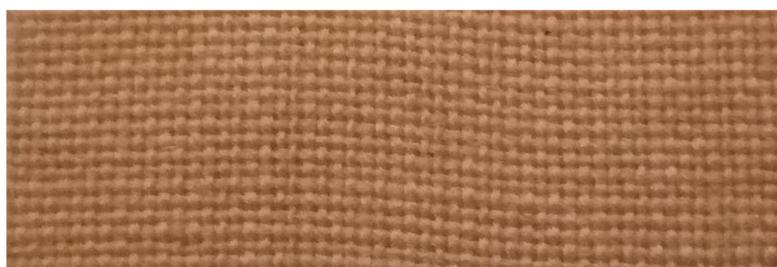


Figure 2. Woolen sample dyed with the Mediterranean strawflower, *Helichrysum stoechas* (L.) Moench (photo taken by the authors).

2.2.1. Sample Preparation

The dyed samples were from wool fabrics. The samples measure 5 cm × 5 cm and were thoroughly cleaned with a scouring agent in order to ensure they were clean of dirt,

chemicals, or any other substances. During the cleaning procedure, the woolen samples were not stirred and the temperature was kept below 60 °C. After washing for about 30 min, the samples were rinsed thoroughly. Following this, the wet samples were dyed by following the procedure.

2.2.2. Dyeing Method

Depending on the recipe, the samples could be either mordanted or not. Temperature, dyeing time, saturation time, and rinsing were also performed according to each recipe. Table 1 summarizes the plants, the concentration by weight, and other auxiliaries used for the sample preparation and dye.

Table 1. Dyestuffs, mordants, and auxiliaries used for dyeing. C = collected in the field, M = bought on the market.

Color	Scientific Name English and Greek Name	Sources C/M	Used Part	% by Weight	Mordants and Auxiliaries	% by Weight
Brown	<i>Allium cepa</i> L. Onion, κρεμμύδι	C	brown onion skins	60%	Potassium alum	25%
Brown				60%	Tartaric acid	6%
Brown				100%	K ₂ Cr ₂ O ₇	3%
Brown				100%	K ₂ Cr ₂ O ₇	3%
Brown				60%	Tartaric acid	6%
Brown				60%	Lye	10%
Brown				100%	Lye	10%
Brown	<i>Amygdalus communis</i> L. Almond, αμυγδαλιά	C	Fresh leaves	60%	K ₂ Cr ₂ O ₇	3%
Brown			Fresh leaves	60%	CH ₃ COOH	3%
Green			Fresh leaves	60%	Lye	10%
Yellow	<i>Calendula officinalis</i> L. Common marigold, καλέντουλα	C	Flowers	100%	CH ₃ CCOH	3%
Brown	<i>Camellia sinensis</i> (L.) Kuntze Tea plant, Τσάι	M	Leaves	60%	-	-
Brown	<i>Castanea sativa</i> Mill. Sweet chestnut, καστανιά	C	Fruits	10%	Potassium alum	25%
Brown				10%	Tartaric acid	6%
Brown	<i>Cercis siliquastrum</i> L. Judas tree, κουτσουπιά	C	Leaves	100%	-	-
Yellow	<i>Cota tinctoria</i> (L.) J.Gay (syn. <i>Anthemis tinctoria</i> L.) Dyer's chamomile, χαμομήλι	C	Flowers	200%	-	-
Brown	<i>Cupressus sempervirens</i> L. Mediterranean cypress, κυπαρίσσι	C	Cones	60%	Potassium alum	25%
Brown					Tartaric acid	6%
Brown	<i>Eucalyptus globulus</i> Labill. Southern blue gum, ευκάλυπτος	C	Leaves	200%	-	-
Green	<i>Ficus carica</i> L. Fig, σικιά	C	Leaves	200%	CH ₃ CCOH	3%
Yellow	<i>Freesia</i> Eckl. ex Klatt Freesia, φρέζεζ	C	Flowers	100%	CH ₃ CCOH	3%
Brown	<i>Hedera</i> L.	C	Leaves	150%	-	-
Brown	Ivy, Κισσός	C	Fruits	200%	-	-
Yellow	<i>Helichrysum stoechas</i> (L.) Moench Mediterranean strawflower, Ελίχρυσσο	C	Flowers	100%	-	-
Brown	<i>Hibiscus</i> L. Hibiscus, Ιβίσκος	C	Flowers	40%	-	-
Brown	<i>Humulus lupulus</i> L. Common hop, Λυκίσκος	M	Fruits	200%	Potassium alum	25%
Brown					Tartaric acid	6%
Brown	<i>Hypericum perforatum</i> L. St. John's wort, Υπέρικο	C	Flowers	60%	Potassium alum	25%
Brown					Tartaric acid	6%

Table 1. Cont.

Color	Scientific Name English and Greek Name	Sources C/M	Used Part	% by Weight	Mordants and Auxiliaries	% by Weight
Red	<i>Kermes vermilio</i> Planchon, 1864 Kermes, Κρεμέζι	M	Female insects	70%	Potassium alum	25%
Red				2.5%	Tartaric acid	6%
Red				10%	SnCl ₂	3%
Red				10%	Tartaric acid	1 g/L
Red				10%	-	-
Brown	<i>Mentha spicata</i> L. Common mint, Δυόσμος	C	???	200%	-	-
Brown	<i>Myrtus communis</i> L. Common myrtle, Μύρτιλο	C	Leaves	200%	Potassium alum	25%
Brown	<i>Papaver rhoeas</i> L. Common poppy, παπαρούνα	C	Petals flower	60%	Tartaric acid	6%
Brown	<i>Persea americana</i> Mill. Avocado, Αβοκάντο	M	Fruit skin	200%	K ₂ Cr ₂ O ₇	3%
Brown	<i>Pinus</i> L. Pine, Πεύκο	C	Bark	300%	-	-
Brown	<i>Platanus orientalis</i> L. Oriental plane, πλάτανος	C	Leaves	100%	-	-
Brown		C	Fruits	200%	-	-
Dark brown	<i>Punica granatum</i> L., pomegranate, ρόδι	C	Fruits skin	300%	FeSO ₄	2%
Brown	<i>Quercus coccifera</i> L., Oak, Πουρνάρι	C	Fruits skin	300%	-	-
Brown		C	Acorns	100%	Lye	25%
Brown		C	Acorns	100%	-	-
Red	<i>Rubia tinctoria</i> L. madder, ριζάρι	M	Rhizomes	60%	H ₂ SO ₄	10%
Red		M	Rhizomes	60%	-	-
Red	<i>Rytiphloea tinctoria</i> (Clemente) C.Agardh, red algae, φύκι	M	Algae	60%	H ₂ SO ₄	10%
Red		M	Algae	60%	CH ₃ COOH	10%
Brown	<i>Taraxacum officinale</i> F.H. Wigg. Dandelion, Ραδίκι του βουνού	C		200%	-	-
Green	<i>Vitex agnus-castus</i> L., Vitex, λυγαριά	C		200%	-	-

Two dyeing circles were performed for each material. The first was undertaken according to the recipe and the second was performed by changing variables such as the mordant procedure and the amount of the dyestuff, the dyeing temperature, and the kind of fabric used in order to produce different shades, providing a valuable database and reference point for further research. An example of dyeing procedures regarding time and temperature is given in Figure 3.

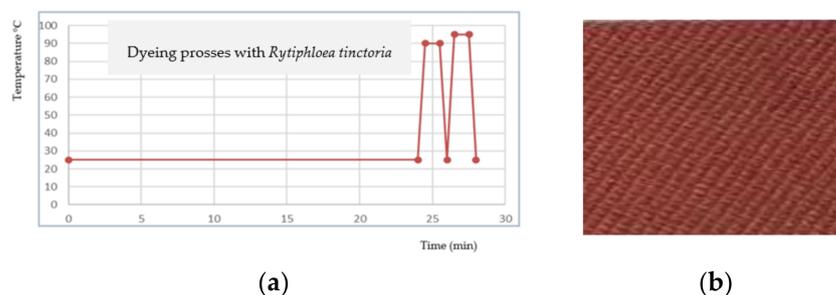


Figure 3. (a) Dyeing prosses with *Rytiphloea tinctoria* (Clemente) C.Agardh, (b) Dyed woolen sample.

3. Results and Discussion

The branched asphodel, *Asphodelus microcarpus* Rchb., *Berberis cretica* L., the oriental plane, *Platanus orientalis* L., (Figure 4) the pink rock-rose, *Cistus creticus* L., the orchil lichen, *Roccella tinctoria* DC, the red algae, *Rytiphloea tinctoria* (Clemente) C.Agardh, and the dyer's alkanet, *Alkanna tinctoria* (L.) Tausch, are plants used in the past for garment dyeing in Greece. It is remarkable that some of the dyeing plants, such as *Cistus creticus* L., were

mentioned by Pliny and Aristotle [25] and continued to be used until recently. All the abovementioned dyestuffs are only a few of the plants recorded through the research.



Figure 4. *Platanus orientalis* L. Oriental plane, (Greek: πλάτανος) fruits and leaves (photo taken by the authors 2013 at Abelakia Greece).

3.1. Classification and Dyeing

The classification and identification of the dye plants and the description of their botanical characteristics is necessary in order to gather knowledge. Usually, every researcher refers to the dyeing procedure of one area. In the results of such research, the plants used for dyeing are documented by their local name. For this research gathering, all this information was crucial since, although some plants have a similar use, in several cases some plants were known in different places within the Greek region by different names and used in different ways. Sometimes, the same plant was used with many different procedures, consequently resulting different shades.

Thus, more than 140 plants used in Greece have been identified. Their use is described in manuscripts such as those of NKUA, while others reached us through oral testimonies.

A large portion of the people interviewed insisted that many of the natural dyes, depending on the dyeing process, had excellent durability and did not fade. They proved their opinion by showing garments, some even dyed more than 100 years ago. The color depth varied depending on the water, pH, and the amount of dye used, which, as is recorded, the dyers were very conscious about. From the data collected, it was proved that the dyeing process affected the quality of the dyed material. Other factors that affect the quality of the dyed garment are the climate conditions, the sunshine, the soil, the water, and the rainfall rates of each region, in relation to plant development. The color tone is mentioned as being modified according to the season of the plant's collection.

Existing documentation indicates that exactly the same materials and similar dyeing techniques were used in various areas of Greece, even in other countries [16]. In the island of Nisiros, for example, *Rytiphloea tinctoria* (Clemente) C.Agardh, a kind of algae (Figure 5a), was used to achieve shades of red. In Cyprus³, hundreds of miles away, it was mentioned as being used for the same purpose. The use of the same algae in Kefalonia for egg decoration (Figure 5b) is a matter of common knowledge even to the present.



Figure 5. (a) The morphology of the algae⁴. (b) Traditional dyed eggs using the algae *Rytiphloea tinctoria* (Clemente) C.Agardh (photo taken by the authors in Kefalonia, during Easter 2015).

Another dye, widely used from Thrace to Crete, is made of *Vitis vinifera* L., commonly known as grape vine. The color variation depends on the part of the plant used. It also depends on the dyeing process. All the testimonies from the bibliography or from manuscripts indicate that they were of excellent quality [26].

The plant *Dittrichia viscosa* (L.) Greuter, also known as Koniza, Akonizia, konizo, nerokonizo, nerokollisia, psilithra, psilithro, and psilistra, is a common plant of the Mediterranean area, which, according to the testimonies, was widely used in Greece as a dyestuff. Kefalonia, Arachova, and Crete are some of the places (all far away from each other) where this specific plant was used for obtaining green shades. However, in some places, there are records for using this specific plant for achieving yellow shades. A more remarkable fact is that in Crete, the false yellowhead, *Dittrichia viscosa* (L.) Greuter was used in combination with other plants in order to dye in different shades [27,28]. Similar to this is the use of parts (leaves, barks, or acorn) of the oak, *Quercus* L. (), which was also a widely known dyestuff. However, by using different procedures, it could produce variations in shades. It is worth mentioning that dyestuffs from oaks, *Quercus* L., dyer's madder, *Rubia tinctorum* L., and dye insects were just a few examples of substances which the trade and consequently the prosperity of places (Figure 6) depended on [29–31].

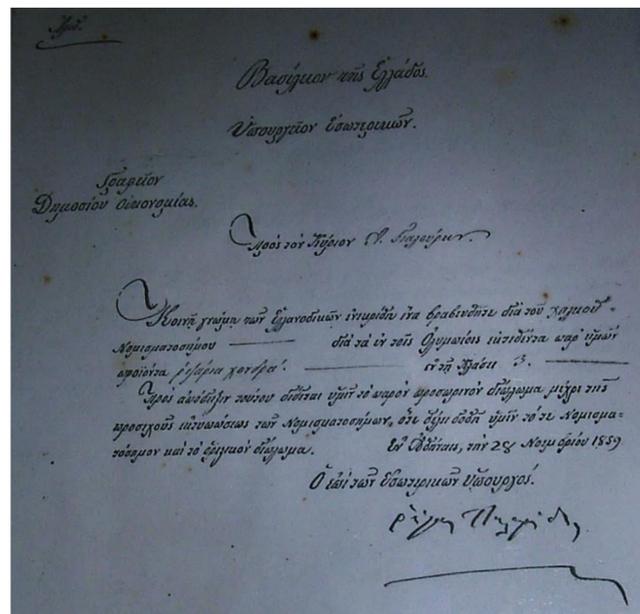


Figure 6. Document found in an old house in the island of Skyros. It refers to a price awarded for the excellent quality of the madder cultivated in the area. The cultivation of madder was a source of wealth and prosperity (photo taken by the authors, Skyros 2007).

3.2. Anthropological Aspects

It is particularly important to mention that many of the dyes were an exportable good for several regions of Greece, and played an important role as a source of enrichment. Examples, such as the partnership of Ampelakia, which was the first partnership to be established, demonstrate the unique role that natural dyes have played and can play in local prosperity [32,33]. The city of Ampelakia experienced days of wealth and spiritual and material prosperity due to the trade of red-madder-dyed fabrics. They safeguarded the secrets they possessed, which gave unique properties to their dye. Part of those secrets include the use of special tools (Figure 7) or secret ingredients, such as pork blood.⁵ From the above, it can be realized that the dyeing was a particularly complex process with many factors that had to be considered to achieve the desired result and the requested repeatability. The method of cultivation, together with the dyeing and mordanting procedure, proved to be of major importance, since they affected the final quality. These, indeed, are the reasons why the madder red of Ampelakia was so famous [34,35].



Figure 7. Stone mortar for pulverizing the dyestuff. Used in Ampelakia [34].

The mores and the customs concerning the color of clothing and fabrics are many. The color combinations of the threads and the decorative patterns reveal the aesthetics and the soul of the folk craftsmen, as well as their beliefs, religious, artistic, and cosmological concerns [36].

In disastrous situations for the local society, the semiology, but also the properties of color, deeply connected to the expression of the inner state of the individual person, were charged with supernatural powers. This is how many beliefs were born around the preparation and use of a clothing color. Through these elements, the importance of natural dyes can be seen [36–38]. For example, it was believed that if one were dyeing while an ill person was present, the dye quality would be poor [39]. The same applied to the presence of strangers while dyeing, because of their bad energy, which would affect dyeing. Such superstitions are recorded in several places in Greece. The supernatural protective powers of the blue and red color are very common. In Crete, a blue thread was used on a baby's legs in order to protect the baby from any bad energy [40,41]. Similar superstitions existed about the day of dyeing; thus, Tuesdays and Sundays were avoided. It was also believed that if someone were to see one dyeing or one's dyed hand, this could affect the strength and the quality of the dye. A large number of such testimonies from various areas of Greece have been recorded during field work, indicating the great importance of dyed garments in the local society [42,43].

4. Conclusions

In conclusion, this is the first time that the natural dyes used in Greece for the decoration of traditional clothes have been studied systematically, allowing us to preserve all this knowledge for future generations. During this first stage of the project, it was possible to record about 140 different plants, and their local names, and a large number of dyeing secrets used for producing vivid and durable colors. The anthropological records reveal the importance of the dyeing materials in dyers' lives. It is important to approach their way of thinking in order to approach their way of acting. The collected data, on one hand, is an extremely useful tool which can be used in a creative way for our modern needs, and on the other hand, can provide useful information for conservators and researchers regarding the materials used for the decoration of textile objects during the 19th and early 20th century in Greece.

More than 2000 manuscripts have been studied so far and many interviews have been undertaken with older people who have used these materials. By gathering and saving as much information as possible, it came to the researchers' attention that an enormous number of plants were used in more than one city or region. These plants were known most of the time by a local name (sometimes quite similar to the one widely used).

The data produced include all the phytological characteristics of the plants, as well as the parts of the plant used, the period collected, and the areas where they were applied, together with images of the plants and various details regarding the recipes used in many

places around Greece with the related documentation. It also refers to ethics and traditions related to the dye, the color, or the dyeing procedure.

The replication of old recipes resulted in dyed samples in shades quite similar to those documented and expected. Some divergences are to be expected. The application of the most commonly used plants on woolen samples on one hand helps in examining how these data could be used for the current needs and also provided samples for the next and final step of this research, the non-destructive investigation of colored fabrics. Hopefully, these techniques will provide data on special characteristics which will be used for dye identification, without the need to sample the objects.

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Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ These manuscripts were created since 1965, when researchers used to visit a place and were gathering raw information about the ethics, the tradition, the way of living, etc. All this amount of information was recorded in the manuscripts, to preserve the knowledge for the next generations. In the NKUA, are gathered more than 3000 different manuscripts from several places of Greece.
- ² Today Cyprus is a different country; however, both countries share common traditions and customs.
- ³ Cyprus is referred, since historically and traditionally is united to Greece.
- ⁴ The photo of the algae is taken from the following site: <https://www.blue-ecosystems.com/racheliSeaWeed/English/Rytiphlaea-tinctoria-%28Clemente%29-C.-Agardh->, last accessed on 20 December 2023.
- ⁵ Pork blood has a high iron content. Iron binds to the dye molecule and the fiber molecule, forming a metal complex. Due to its large size, it is supposed to reflect the light giving a bright shade.

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