

PRODUCING SOOT INK BY TRADITIONAL METHODS AND RESULTS OF ITS APPLICATION IN THE OTTOMAN BOOK ARTS[†]

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ABSTRACT

The use of writing as aesthetics is rare in the world. The most important civilization using writing as aesthetic elements is Islamic civilization. The most common use of writing which used in every field in all Islamic geography is seen in book arts. The high quality was based in production of paper, reed pen and ink in Ottoman calligraphy art and great efforts were spent for each material. In some manuscripts belonging to the Ottoman period, formulas were found concerning the preparation of the ink. Ink, made in these formulas, were described in detail in the Ottoman manuscripts. Unlike Ottoman ink, produced with natural materials, inks being used present are chemical based. A significant portion of inks is black ink and other color inks are included in the recipes too. These recipes seen in the Ottoman period manuscripts are analyzed and practical trials have been carried out. Black inks are separated among themselves as the ones producing with soot and the others which are obtained by combining ferrous sulfate with gall. In this study, recipes, applications of inks produced with soot and the response time of the ink and its results obtained from ink on paper will be discussed.

Key words: Ottoman, art, calligraphy, soot, ink, manuscript

Introduction

Writing has a particular importance for every civilization since the first time it was used. In Islamic Civilizations, it has been used as an aesthetic element in addition to being a tool for recording knowledge. Although oral culture was common in the early years of Islam, writing and making copies of Qur'an has gained importance to be understood correctly by different nations with the expansion of the Islamic world. Inscriptions were presented more beautifully with spiritual feelings and religious efforts by Muslims. In this regard, different styles of writing were born (Khalili, 1996, p. 9). In addition, the negative attitude towards painting and sculpture in Islamic civilization has been a significant factor in the use of writing as an aesthetic element.

Due to the negative outlook to the picture in the Islamic culture, calligraphy has become an important element in the artistic activities. Calligraphy has become an alternative to painting and surfaces are adorned with calligraphic inscriptions both in architectural and other areas. Sometimes, aesthetics of the inscription has become more popular compared to the content of the writing. Special areas were created for beautiful calligraphy in the areas of architecture and art especially in the Ottoman civilization and beautiful inscriptions were written on these areas by important calligraphists (Alparslan, 2007, p. 15).

The Ottoman Empire, which treated art and artists with honor, had an indisputable superiority in the book arts. This superiority has arisen from the importance of art as well as careful preparation of the materials used to create these books. The reed pen used to write the calligraphic inscription and the paper is selected carefully through a process so precise (George, 2010, p. 49). After painting the paper with colors that are not straining eyes, it is dressed for easy movement of the pen and in order to erase mistakes made in the writing. After the process of dressing, the paper is sealed to remove the burrs. The ink is also subjected to a series of processes in order to get the best quality results. In this way, masterpieces that still preserve the vitality and beauty of art were created by using the highest quality materials.

The production of ink has reaches its peak in terms of color and quality in the Ottoman civilization. Writings in books and treatises of Ottoman period have survived without losing anything from their color and vitality even after centuries. A foundation has been established for the ink production to meet the demand of calligraphers who practice the art of calligraphy (Derman, 1967, p. 11).

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Ink production in the Ottoman Empire has become a serious industry. In the 17th Century, there were 40 ink shops and 65 people working in this sector in Istanbul in order to meet the need for ink (Evliya Çelebi, 2006, p. 331). It is also known that there was an arts organization consisting of those receiving their wages from the palace in Ottoman Empire. There were also those working to produce in the groups of this organization called Ehl-i Hiref (artisans in Ottoman Empire). According to archival records, the number of employees, who used to produce ink in the Ottoman Palace in 17th-18th centuries, in this group ranged between 1-4 (Yaman, 2008, p. 43-46). The art of producing ink in the Ottoman Empire began to disappear with the spread of the combination of pen and ink by European civilizations.

Interest in the art of calligraphy still keeps its important today in Muslim countries. However, the inks produced and used for applying this art is generally chemical. The colors of some examples prepared by this kind of inks loses its brightness in time. Therefore, the survival of these works prepared for aesthetic purposes can fall in jeopardy in contemporary circumstances. The aim of this study is to maintain the reproduction of traditionally produced inks with an approved quality, and also to improve the quality and the maintenance of the works produced by the contemporary calligraphers.

A-Having Soot By Using Traditional Methods

Since soot creates difficulties due to smoke generated during production, it cannot be obtained in the city. Therefore, those producing soot and those producing ink from this material were different people in the Ottoman Empire. Ink production facilities were established in the city center, while places producing soot were established near the city. Soot was processed by these people to produce ink in production facilities established nearby Tekfur Palace around Egrikapi district of Istanbul (Derman, 1967, p. 78).

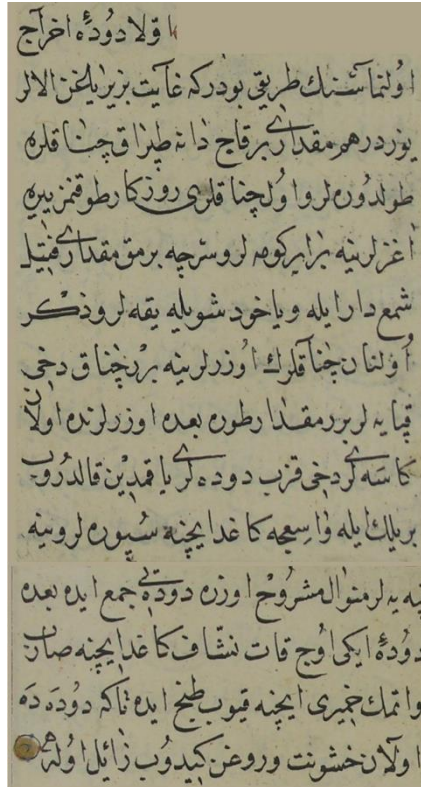
In some of the mosques, the soot generated by oil lamps was used to manufacture ink by depositing them in a system at a certain place. The air stream was calculated to obtain soot and it was collected in a special doorway. Suleymaniye Mosque is the most beautiful example of this process. The mosque has doorways at the top of the north gate. The soot coming from oil lamps burned in the mosque is accumulated through these vents with the air circulation in the soot rooms. Calligraphers, who need ink for writing, used the soot to produce ink (Serin, 1999, p. 294). (Plate 1)

Plate 1: Suleymaniye Mosque (1557) and its soot room.



The production of ink with the conventional method is described by Nefeszâde (1650) as follows: “100 dirhams¹ linseed oil is filled into earthenware pots. These pots are buried up to their tops in a place with no wind. The linseed oil is closed by a lid with a finger thick wick. When the wick is fired, it is covered with a second container which will not stop burning. When soot is began to gather in the container, the fire is taken away before burning the soot. The soot deposited on the lid is swept over a wide paper using a feather. The lid is closed on the fire again and this process continues until the oil is finished. The collected soot is put into a piece of paper and cooked in an oven after covering it with bread paste. In this way, the oil and hardness in the soot is destroyed.” (Nefeszade İbrahim, f. 55b) (Plate 2)

Plate 2: Having soot in the manuscript.



Although soot can be obtained after burning different materials, the soot collected by burning linseed oil is a more suitable material for making the ink, because it is thin and intense. In the above-mentioned method, a significant amount of soot is lost to the air without sticking to the plate. In our method, a certain mechanism was established and the loss of soot was minimized. 116 g soot was obtained from 5 liters of linseed oil with the grid system and stove developed. (Plate 3).

Plate 3: Having soot.

¹ 1 dirham = 3,2 g

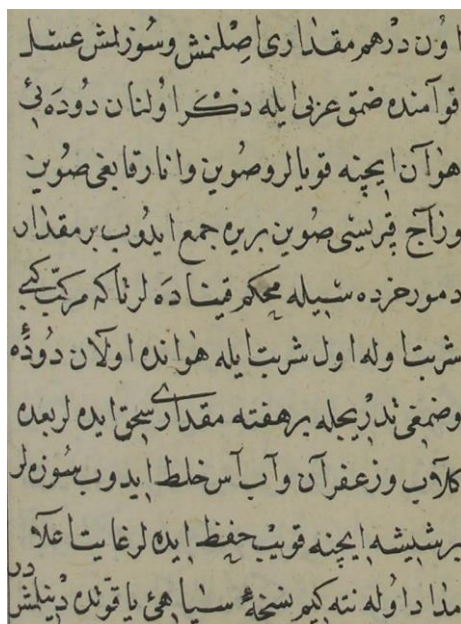


B-How To Make Soot Ink And Result Of The Application: Method 1

Special ink was produced especially for the calligraphic inscription to be written in the Ottoman Period. Those producing ink used to ask calligraphists for what type of calligraphy the ink was going to be used. Because they used to produce ink with different consistencies for different writing styles such as thuluth, italics and naskh. For example, if a calligraphist can write a “basmala in naskh style” after putting the pen into inkwell only once, that ink is considered to be good. Different methods and materials were used in order to produce the ink with the best possible way. Two basic methods are common to produce black ink. The first one is produced from soot, and the other one is produced from arbor vitae and ferrous sulfate. Many different substances were added to these inks and various treatments have been applied.

In practice, the ink production method given in the copy named *Gülzâr-ı Savab* of Nefeszâde İbrahim was used. The method is as follows: “10 dirhams of Arabic gum with a filtered honey consistency is put into a mortar with some soot. Pomegranate peel juice and iron sulfate water is combined in a pot and boiled with an amount of scrap until the mixture becomes like a sherbet. This sherbet and soot and gum are gradually crushed in a mortar for one week. Then rose water, saffron and myrtle water is mixed and filtered and added to the ink. The resulting ink is maintained in a bottle. This is a fine ink.” (Nefeszade Ibrahim, vr. 56a) (Plate 4)

Plate 4: Making soot ink in the manuscript.



In this method, amounts of the materials used are not specified except Arabic gum. Therefore, prepared materials were used in the estimated quantities. The materials and their amounts are as follows:

- 2.5 g cooked soot
- 32 g Arabic gum
- 25 g pomegranate peel
- 10 g of iron sulphate
- 40 g of iron scrap
- 1 g of dried myrtle leaves
- 0.05 g saffron
- 25 g rose water
- 155 g of pure water

First, 40 g of nails that are 3 cm in size were put into a jar and water is added and they were kept in this jar for 8 days.

The cooked soot and Arabic gum is combined and crushed in a mortar for about a week and smashed with finger.

In a separate container, pomegranate peel and 125 g of water is boiled for 5 minutes and filtered. 80 g of yellow color water is obtained.

Ferrous sulfate was dissolved with 30 g of water.

The yellow color liquid obtained from pomegranate peel and 30 g liquid obtained from ferrous sulfate were combined and we had a black mixture.

The iron scrap consisting of nails put in a jar and kept for 8 days was added into this liquid and they were boiled for 20 minutes.

The 50 g mixture remained after processing was added to the mixture prepared previously with soot and glue. It was mixed intermittently for two weeks.

Dried myrtle leaves, saffron and rose water were stored in jars for a day. The yellow liquid obtained from these materials was added to the ink.

The ink consisting of these mixtures was filtered through tightly woven cotton fabric and 85 g ink was obtained.

After these processes, the problem of previously formed foam was eliminated and the ink has become ready to use.

The color of ink is not exactly black and it was like yellowish.

Although there is no fluidity problem of the ink, the background of the writing can be seen due to the partial transparency of the ink. No visible color change was observed in the writing after keeping it under sunlight for 5 months. (Plate 5)

Plate 5: Making soot ink



C-How To Make Soot Ink And Result Of The Application: Method 2

The ink production method given in *Âhar Mecmuası*, which is estimated to be published in the 18th century in Istanbul National Library, is as follows:

- 6.5 dirhams soot
- 26 dirhams gum
- 13 dirhams gall
- 6.5 dirhams alum

First, gall is boiled. Alum is burned and added to the water. Then, the Arabic gum is mixed with this water. Then, soot is added to the mixture slowly. A good quality ink is obtained after filtration.” (*Ahar Mecmuası*, f. 2b) (Plate 6)

Plate 6: Making soot ink in the manuscript.

مركب

دوده ۶۰۰ صنغ ۲۶ گال ۱۳ سوز ۶.۵

اولا گال رو بجا قینا دو ب بعدہ شہر یا قوب یا زو
صوبہ صنغ بعدہ صنغ ہو صوابہ اصلا دو ب بعدہ
دودہ بی تدریج آتش بر دو ب زیادہ دو کہ
سوز دو ب اعلا مرکب اولو

The amounts of substances are not specified clearly. The amount of water used is also not clear. Therefore, the amount of water is estimated. The ink is produced using half of the materials listed. The production process of the ink is as follows:

- 20 g gall
- 10 g alum
- 10 g soot
- 180 g of pure water
- 40 g of Arabic gum

Gall is added to 80 g of water and boiled for 10 minutes. Then, it is filtered through a piece of cloth. Approximately 40 g of liquid was obtained.

Alum is cooked and evaporated. The white residue remained on the bottom of the container was added to the mixture after crushing.

10 gr was added to the mixture and crushed with finger. The remaining water is added on the second day and it was crushed again. The mixture was filtered and put into a jar. Then, Arabic gum was added to the mixture with a consistency of honey.

The black color of the ink is quite dark and bright. It is resistant to the sunlight. No fading was observed even though it was kept under sunlight for 5 months. Its fluidity is also good and it is good for writing. (Plate 7)

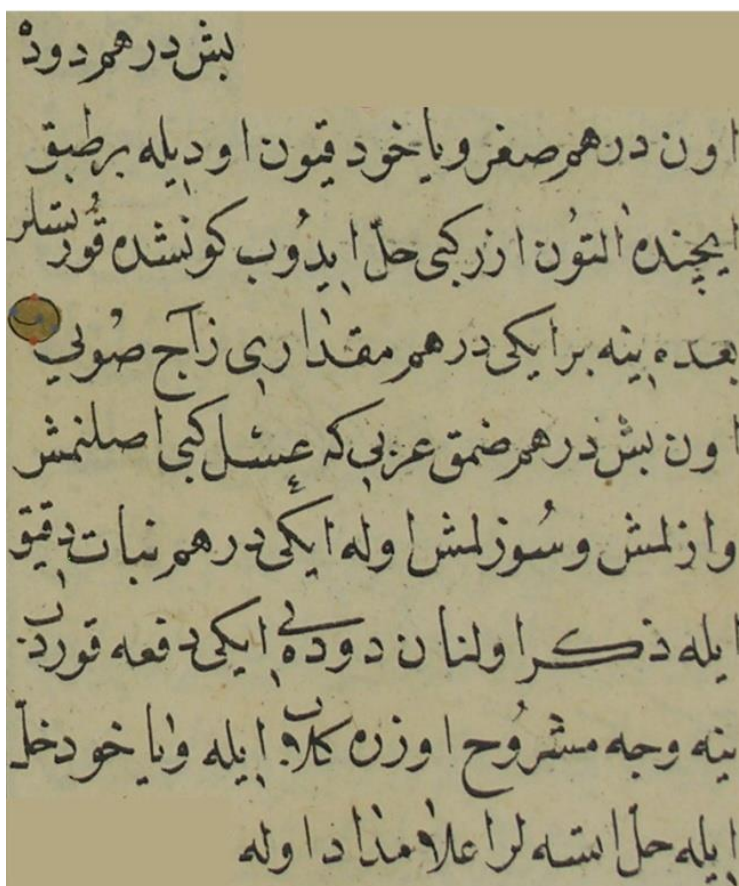
Plate 7: Making soot ink.



D-How To Make Soot Ink And Result Of The Application: Method 3

The third formula is given in the work of Nefeszâde İbrahim (1650) named *Gülzâr-ı Savab*. The method is as follows: “5 dirhams of soot is crushed with 10 dirhams of cattle or sheep bile as the gold crushing process and dried under the sunlight. This dried mixture is combined with 2 dirhams of iron sulfate water, 15 dirhams of gum with a consistency of honey, 2 dirhams of crystallized sugar. This mixture is also crushed and dried. The soot produced is mixed with rosewater or vinegar to obtain a good quality ink.” (Nefeszade İbrahim, f. 57b) (Plate 8)

Plate 8: Making soot ink in the manuscript.



We used one fifth of the substances as listed below:

- 3.2 g soot
- 6.4 g bile
- 1.6 g crystallized sugar
- 1.6 g of iron sulfate
- 10 g Arabic gum
- 75 g rosewater

Soot and bile are mixed and dried and then 2 g of water is added and the mixture was crushed. Then, it was dried under sun light.

Crystallized sugar and iron sulfate were melted in 1.6 g of water separately.

The melted crystallized sugar, iron sulfate and Arabic gum with a consistency of honey is added to the dried soot and crushed with finger again. The mixture was dried again. Then, rosewater was added to the mixture and 81 g of ink was produced.

The color and fluidity of the ink is fine. The yellowish color in the ink added beauty to the writing. Although the sample inscription written with the ink produced was kept under sun light for 5 months, no change was observed and no color loss was seen. (Plate 9)

Plate 9: Making soot ink.



E-Results

Today, although all civilizations use similar modern writing instruments, it is important to use traditional materials for aesthetics and original writing examples. The quality of the ink produced in the Ottoman Empire is proven by the tens of thousands of manuscripts without losing their colors and vitality for centuries. In contrast, today's manuscripts written by using contemporary inks lose their color and vitality after a certain time.

After the spread of printing, calligraphy in the Islamic civilization retains its importance and it remains to be an important artistic activity of Islamic civilizations. It is very desirable to keep the colors and vitality of the writings for a long time. Some of the formulas we used to produce ink come to the fore in terms of color and quality. Application results were evaluated in terms of color, fluidity and resistance against the sunlight. The formulas discussed in this study give positive results and they can be used to produce ink. The quality of inks produced through these methods is approved by us. Applying these formulas by using different amounts of substances and using technological possibilities will certainly give better results. Furthermore, mass production of these high quality inks will allow calligraphists to produce their works without losing their color and vitality for centuries.

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