NEW DEVELOPMENT ON MEDICINAL AND AROMATIC PLANTS

EDITED BY
Assist. Prof. Dr. Gülen ÖZYAZICI

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CHAPTER 15

COLORING CHARACTERISTICS AND FASTNESS DEGREES OF LICORICE (*Glycyrrhiza glabra*)

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INTRODUCTION

The use of natural dyes in textiles from the beginning of human history to the beginning of the 19th century was first introduced in 1856 by W.H. With the discovery of "Mauveine", the first synthetic dyestuff by Perkin, it has gradually been replaced by synthetic dyestuffs. (Tarakçıoğlu, 1983).

Until the invention of synthetic dyestuffs, natural dyes were used in the fields of textiles, food, medicine and cosmetics that directly affect the human body. Synthetic dyes have quickly replaced natural dyes due to reasons such as low cost, offering a very wide color scale, making the applied procedures more effortless and in a short time. Synthetic dyestuffs are used not only in clothes, but as food dyes everywhere today. Since it has been used for more than a century, its negative effects on human health have started to emerge and the return to natural dye has started, especially in developed countries.

Like many other industries, textile dyehouses strive to improve their sales performance by offering an alternative product range for their customers. Particularly, environmentally conscious consumers accelerate this process by examining the production processes of the textile materials they use and taking care to choose environmentally friendly products. Manufacturers enrich at least some, if not all, product pallets with products that we can describe as special production (Benli, 2020).

Although it is troublesome in entire world due to its other superior features, there is a return to nature in every subject. As in other fields, the trend of returning to nature in textiles has increased the importance of natural dyes in textile, especially in carpet and rug dyeing (Özbek, 1996).

In the study, dyeing studies using different mordants with the licorice plant grown in other regions of our country, especially in the south-eastern Anatolia region, are presented. In addition, the degrees of friction, light and water drop fastness, which are very necessary for textile products, were measured.

1. PROPERTIES OF LICORICE (*Glycyrrhize glabra*) FROM MEDICAL AROMATIC PLANTS

There are around ten thousand plant species in our country and about three thousands of them are endemic. It is accepted that up to 1000 of these plants are used for medicinal purposes (Arslan et al., 2000).

5 species of licorice root, which is a member of the Fabaceae (Legumes) family, grow in our country, but one of them has medicinal value. The species that spread in our country; *Glycyrrhiza glabra* L. var. *glandulifera* (Waldst et Kit.) Boiss., *G. glabra* L. var. *glabra* is *G. echinata* L. The roots and rhizomes of the licorice plant and the licorice extract obtained from them are used. It contains licorice, starch, sugar (glucose, sucrose), gum, resin, bitter substance, flavone glycosides, glycyrrhizin, calcium, nitrogen, potassium and magnesium, asparagine and mannite. Glycyrrhizin is 50 times sweeter than sugar, its presence in roots varies between 5 - 13%. According to the analysis, it was

determined that there was 8.6% water, 5.5% ash, 31.9% extract (gum and starch), 1.5% glucose, 2.3% sucrose, 4.7% resin and 9.5% glycyrrhizin. has been. Licorice roots which find a wide variety of uses in the industry are used as an additive in the production of cola and used as an additive in the production of cola, and in the production of beer to foam. It is used as a taste modifier in the pharmaceutical industry, as well as in the preparation of tablets, and is also included in the composition of drugs used to soothe kidney and stomach diseases and nerves. It is mixed with tobacco to reduce the effect of nicotine in cigarette production. As it is used in the confectionery industry, licorice honey has also been used in the production of tahini halva in recent years. Press residues from the production of licorice honey are used in the production of wall plates called maftex. As a drug, it has phlegm and diuretic, reduces nicotine damages, cleans the bronchi, removes kidney diseases, reduces kidney and bladder stones, and heals ulcer wounds in the stomach (https: //www.kalkinmakutuphanesi.gov.tr /assets/ upload/ dosyalar/ adiyman- tibbi-ve-aromatik-bitkilerraporu_.pdf/ Date of access: 10.05.2021).

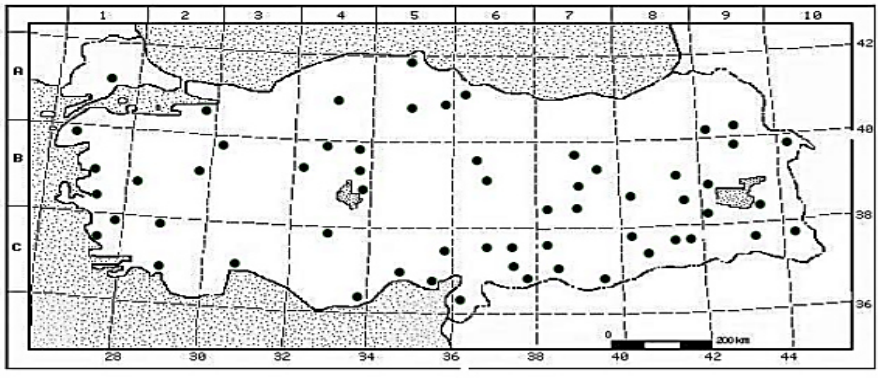


Figure 1. Spread Areas of Glycyrrhiza Glabra Species in Our Country (Çetin, 2015)

Licorice was mentioned as "super medicine" in Shen Nong Herbal, which was compiled about 2000 years ago in China and contains a list of more than 365 herbal medicines. Hayatizade Mustafa Feyzi Efendi, who was the chief physician of the sultan during the period of Sultan Mehmet the Fourth (1642-1693), described the root of Licorice. "It is beneficial for chest diseases, it removes the heat and thirst, the dried form is good for cataract disease if it is rubbed on the eyes, licorice root extract is good for chest pain, ulcers, bladder and kidney diseases, it is useful for cough" (http://e-kutuphane. teb.org.tr /pdf/ eczaciodasiyayinlari /ila_habr-eyll08/7.pdf/ Access Date:10.05.2021).

Glycyrrhiza species are used in ulcer treatment as antimutagenic, anti-arrhythmic, antimicrobial, antibacterial, anti-viral, anti-arthritic, anti-allergic, phlegm and anti-inflammatory (Çetin, 2015). The *Glycyrrhiza glabra* species has been used for medical purposes for about 4000 years. Humnubari laws contain records regarding the medical use of Glyycyrrhiza. Hippocrates mentioned that it is used in the treatment of ulcers and to quench thirst. Also mentioned as medicine in Theophrastus, Dioscorides, Pliny, Elder, Culpepper (Anagha et al., 2012). The Roman Union considered it an indispensable food in their long tiring expeditions. Roman soldiers said they could go without eating or drinking for 10 days, as it helped to energize and maintain stamina by quenching thirst and hunger (Anagha et al., 2012). *Glycyrrhiza glabra* is a plant that has been widely used both by the public and in the field of medical treatment since ancient times. This drug, which contains saponoside (glycyrrhizic acid) and flavonosides

30 (liquitoside and isolychritoside), which are still included in the composition of preparations used against ulcer and upper respiratory tract diseases by taking advantage of its antispasmotic, anti-inflammatory and antacid effects, is also a valuable export substance in terms of our country's economy. Glycyrrhiza species are given names such as Licorice, Miyan, Piyam, Payam, Payan in our country. In addition, in the Aegean Region, *Glycyrrhiza echinata* species are given names such as bitter pian, bitter root due to the bitter root. *Glycyrrhiza glabra* type is used in our country as a cold, cough, breast softener, preventing mucosal irritation and against ulcers (Tanker &Özkal, 1977-1978). The active ingredients of the genus Glycyrrhiza and their usability in drug production have been investigated by many researchers. Glycyrrhiza species contain saponin, flavonoid, polysaccharide, pectin, simple sugars, amino acids, mineral salts and some other substances (Kataria et al., 2013; Çetin, 2015).

Picture 1: Licorice Plant (https://www.kalkinmakutuphanesi.gov.tr/assets/upload/dosyalar/adiyman-tibbi-ve-aromatik-bitkiler-raporu_.pdf/ Erişim Tarihi:10.05.2021)

In this study, the colors, light and friction fastness values obtained by using various mordants from the licorice plant with yellow color scale feature were determined.

1.1. MATERIAL AND METHOD

The material of the study consists of the colors obtained by the dyeing method from the licorice plant, the fastness values and the use in textile fibers. Mordants used in the study were obtained from Sivas Cumhuriyet University Sivas Vocational School Handicraft Department, Painting Workshop. These mordants; 1.Aluminium alum - KAI (SO4) 2, 2. Copper sulphate (Eyebrow) - CuSO4.5H2O, 3. Iron sulphate (Cyprus) - FeSO4.7H2O, 4. Tartaric acid - (C2H2 (OH) 2 (COOH) 2-C4H6O6), 5. Acetic Acid, 6. Zinc Chloride, 7.Citric Acid, 8. Sodruy Hirdosulfite, 9. Copper II Sulphate, 10. Potassium Bi chromate-K2Cr2O7. In addition, mordant-free ropes were dyed and a comparison was made with the color absorption of mordant-free ropes. In the research, by scanning the sources about natural dyeing, dyeing and dressing methods, the mordant of the yarns, the preparation of the dye extract, the dyeing with and without mordant, the determination and naming of the colors obtained, the determination of light and friction fastness were stated.

As a method; Mordant of wool yarn, preparation of dye exracts, dyeing without mordant and mordant, determination and naming of colors, evaluation of colors, determination of light and friction fastness methods were used.

1.2. Mordant of Wool Yarns

Wool threads were mordant separately with each of the 10 different mordant materials specified in the material section. Mordant material was used at the rate of 2% and 4%, and wool yarn was dyed separately with each mordant. Mordant material is dissolved in 1 to 20 ratio of warm water, pre-moistened wool yarn is pressed into this mordant water. After boiling for one hour, the wool was allowed to cool in the boiling pan. After the ropes have cooled, they are squeezed out of excess water, dried and made ready for dyeing. At this stage, rinsing is never done.

1.3. Preparation of Hot Extract

The parts of the plants containing dyestuffs, dried fruit shells, all parts of the plant such as root-stem-branch-flower, stem shells, subsoil shoots were cut into small pieces by hand and knife in order to ensure that the dyestuffs they contain pass into the water. Later, the plants purchased at a rate of 100% according to the weight of the wool yarn to be dyed were boiled in water at a rate of 1 to 20 according to the wool to be dyed for 1 hour. At the end of 1 hour, the plant residues were removed from the environment by filtering with a cheesecloth. Thus, the hot extract was obtained.

1.4. Painting Process

The hot extract was obtained by using 100% of the plants. Previously standing in water for 1 hour soaked wool were put in the 20 to 1 ratio by weight extrakt. After reaching the boiling point, it was boiled for one hour with continuous stirring. Less water was added during boiling.

After cooling, it was rinsed with plenty of cold water and dried in a low light and airy place.

Picture 2: Boyama İşlemi (Kaynar, 2017)

In dyeing with mordant, the wools that were previously mordant were soaked in water for at least one hour before starting the dyeing process, and then boiled in a hot extract prepared at a rate of 1 to 20 for one hour and left to cool on their own. It was then rinsed with plenty of cold water and dried in an airy place with little light.

Picture 3: Drying Dyed Wool Yarns (Kaynar, 2017)

1.5. Determination and Naming of Obtained Colors

21 dyeings were done by applying the ratios of 2% and 4% with hot extracts obtained by using 100% of licorice plant without mordant and with different mordants. The colors obtained as a result of this painting were named by a commission.

1.6. Determination of Light Fastness and Friction Fastness

This stage belongs to the measurements of light and friction fastness, which are important for the use of dyed wool yarns in textile products. The determination of light fastness in dyed wool yarns was made on the basis of TS 867 (Color Fastness Determination Method against Daylight) (Anonymous, 1984a) and DIN 5033 (Farbmessung Begriffe der Farbmetrik) (Anonymous, 1970) methods prepared by the Turkish Standards Institute. For the determination of light fastness, blue wool scale (wool fabric strips dyed using various blue dyes graded from 1 to 8) and wool yarn samples were used. The blue wool scale is affixed on the cardboard from 1 to 8, respectively, 1 cm in length and 6 cm in width. Likewise, dyed wool yarn samples were wrapped parallel to each other, with a length of 1 cm and a width of 6 cm, on cardboard. 10 cm and 5 cm wide strips were cut from the cardboard, placed on top of each other and a binding was made. Wool yarn samples prepared in two parallel on cardboard cut in 7 cm width and blue wool scale samples cut in 1 cm width were placed on the cardboard skin in a way that half of it was closed while the other half could see daylight. After the samples were placed at 45 degrees to the incident of light, they were checked at the same times every day. Wool yarn samples were evaluated according

to the fading in the blue wool scale. The blue scale (blue dyed wool scale) is used only for light fastness measurement. Gray scale is used for all other fastnesses. In determination of friction fastness; Determination of friction fastness in dyed wool yarns according to TS 717 (Determination of Color Fastness to Friction) (Anonymous, 1978) prepared by the Turkish Standards Institute and TS 423 (Color Fastness Determination in Textile Products for the evaluation of stains (dye bleeding) and fading (color change) Using Methods of Gray Scales) (Anonymous, 1984b).

Dyed wool threads were wrapped side by side and parallel, 5 cm wide, on a 14 cm x 7 cm rectangular cardboard loop. By placing a dry, unpainted 5 cm x 5 cm sized plain textured cotton cloth on the tip of the test device, the dry samples prepared in two parallel under 900 gr load were rubbed back and forth 10 times in 10 seconds on a straight line along the 10 cm section. Color flow to unpainted cotton cloth was evaluated according to TS 423 with gray scale (Anonymous, 1984b).

2. FINDINGS

The values of the colors obtained in the study for light and friction fastness on wool carpet yarns are shown in Table 1. According to this; It was determined that the light fastness values of the colors obtained by using licorice plant and various mordants varied between (5--7), and the light fastness value of the color obtained by dyeing without mordant was found to be (5). In light fastness measurements, 4 and 5 are close to each other. Since 7 and 8 values are found in very few plants, 5 values

can be evaluated as (good) and 7 as (very good). It is seen that the light fastness value is quite high.

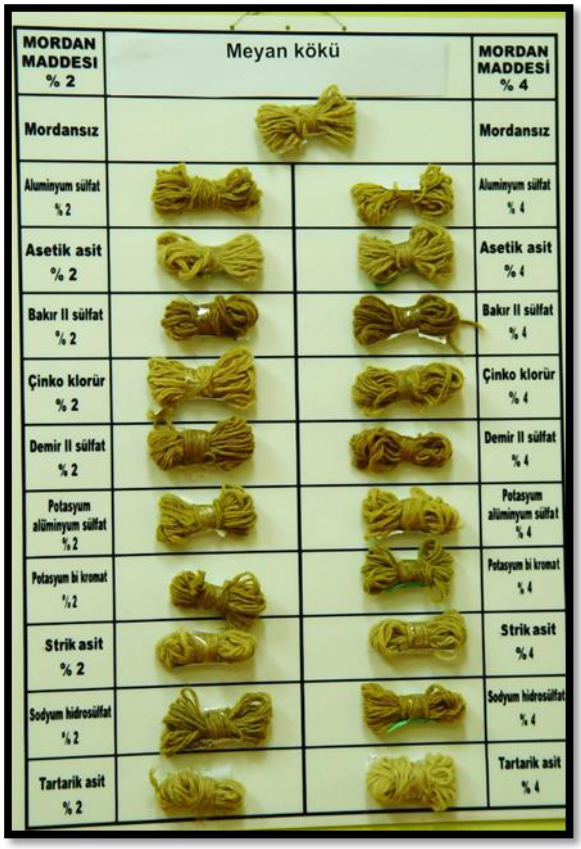
It is seen that the friction fastness values vary between (1-4) and the colors obtained by dyeing without mordant have friction fastness values (3-4). The lowest (1) value was found with Iron II Sulphate, and the highest value (4) was found in dyeing with Citric acid, Copper II Sulphate and Citric acid.

Table 1: Licorice Plant Light, Friction Fastnesses

SN	**Mordant**	**Light Fastness**	**Friction Fastness**	**Colors**
1	Acetic acid 2%	5	3_4	Olive oil green 1
2	Acetic acid 4%	5	3	
3	Copper II sulphate 2%	7	4	Olive oil green 2
4	Copper II sulphate 4%	7	3	
5	Zinc chloride 2%	5	2_3	Pickled Olives 2
6	Zinc chloride 4%	5	2_3	
7	Iron II sulphate 2%	7	1	Pickled Olives 2
8	Iron II sulphate 4%	7	1	
9	Potassium aluminum sulphate 2%	7	3	Olive oil green 3
10	Potassium aluminum sulphate 4%	7	3_4	Olive oil green 3
11	Potassium bi chromate 2%	5	4	Olive oil green 3
12	Potassium bi chromate 4%	5	2_3	Olive oil green 4
13	Citric acid 2%	7	3_4	Cumin 1
14	Citric acid 4%	7	4	Cumin 2
15	Sodium hydrosulfite 2%	5	4	Coffee foam 1
16	Sodium hydrosulfite 4%	5	3_4	Coffee foam 2
17	Tartaric acid 2%	5	3_4	Straw Yellow 1

18	Tartaric acid 4%	5	4_5	Straw yellow 2
19	Copper sulphate 2%	7	3	Pickled Olives 3
20	Copper sulphate 4%	7	2_3	Pickled Olives 4
21	Mordant free	5	3	Cumin2

Coloring samples made with licorice plant are given in Picture 4 and 5. The colors obtained are; Olive oil green, Pickled olive, cumin, straw yellow and coffee foam and coffee bean colors. The proportion of purple affects the color tone.



Picture 4: Licorice Color Chart -1 (Kaynar, 2017)

Picture 5: Licorice Color Chart -2 (Kaynar, 2017)

3. CONCLUSION

The negative consequences of rapid industrialization experienced today pandemicallay, terms of environment and human friendliness, has gained importance. Natural procedures that do not harm nature and people, use natural raw materials and do not leave chemical waste have started to be investigated again. The healing properties of plants against diseases have been known for thousands of years. Recently, there has been an awareness of what should be done to avoid getting sick before

treating a disease. In this context, to take protective precautions preventive f, it has become the priorities of developed countries. The usage areas of plants have also been expanded. In addition to treatment, natural substances and herbs have been used in preventive folk medicine.

It is known that the licorice plant, which has been used in the south and south-eastern provinces of our country for many years, has an important place among medicinal aromatic plants and is good for many diseases. In this study, dyeing experiments were carried out with licorice root in order to expand the usage areas of plants and to create an alternative to chemical substances. The results obtained have been evaluated in terms of the textile industry. When the results of the fastness tests are examined, it is seen that the light fastness which is an important feature for the dyes used in the textile industry, is at a good level. Different results were obtained in friction fastness. As a result, it has been determined that licorice root can be used as a dye in the textile sector by preventing dye erosion by natural methods.

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Picture 1: Licorice Plant (https://www. kalkinmakutuphanesi. gov.tr/assets/upload/dosyalar/adiyman-tibbi-ve-aromatik-bitkiler-raporu_.pdf/ Erişim Tarihi:10.05.2021)

Picture 2: Boyama İşlemi (Kaynar, 2017)

Picture 3: Drying Dyed Wool Yarns (Kaynar, 2017)

Picture 4: Licorice Color Chart -1 (Kaynar, 2017)

Picture 5: Licorice Color Chart -2 (Kaynar, 2017)

CHAPTER 16

GENERAL CHARACTERISTICS AND BIOLOGICAL ACTIVITIES OF RANUNCULUS SPECIES

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