

A Research on the Colors Obtained from Rockrose (*Cistus laurifolius* L.) and Their Fastness Values

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Abstract: Rockrose is a plant of class Pareitales, family *Cistaceae*, genus *cistus* L. The aim of this research is to determine colors obtained from rockrose with different mordants and mordanting methods, these colors fastness values such as light, friction, wet and dry water drop fastness, and to form a color catalogue.

In this study, by doing totally 45 dyings, rockrose gave very different kinds of colors, if mordants were used alone at the rate of 3% and 5%, yellow, earth color, mustard, cumin colors and tones were obtained from rockrose. Mustard, tobacco and yellow tones were obtained by mixing fixed Pbc with the other mordants separately. If mordants were used alone, light fastness values were between 2 and 8 generally. They were in the middle level. However, they changed between 4 and 8 by mixing fixed Pbc with the other mordants separately. They were generally in the good level. The friction fastness values of the colors obtained from rockrose were between 1-2 and 3-4 generally. These values were in the middle or good level. The water drop wet and dry fastness values of the colors obtained from rockrose were between 3-4 and 5 generally in both method.

Key Words: vegetable dying, rockrose, mordant, carpet, rug

Pinar (*Cistus laurifolius* L.) Bitkisinden Elde Edilen Renkler ve Bu Renklerin Bazı Haslık Değerleri Üzerinde Bir Araştırma

Özet : Pinar Pareitales sınıfından, *Cistaceae* familyasının *cistus* L. cinsine ait bir bitkidir. Bu araştırmanın amacı farklı mordanlar ve mordanlama yöntemleri ile pinar bitkisinden elde edilen renkleri ve bu renklerin yün halı iplikleri için önemli olan haslık değerlerini belirlemek ve bir renk kataloğu oluşturmaktır.

Bu çalışmada, toplam 45 boyama yapılarak pinar bitkisinin çok farklı renk tonları verdiği belirlenmiştir. Mordanlar %3 ve %5 oranlarında kullanıldıklarında, sarı, toprak rengi, hardal, kimyon rengi ve tonları elde edilmiştir. Pbc mordanı sabit tutulup diğer mordanlar ile ayrı ayrı, eşit oranda karıştırılarak yapılan boyamalarda ise hardal, tütün ve sarı renk ve tonları elde edilmiştir. Mordanlar tek başına kullanıldığında, ışık haslık değerleri 2 ve 8 arasında bulunmuştur. Pbc mordanı sabit tutulup diğer mordanlarla eşit oranda karıştırıldığında 4 ve 8 olarak bulunmuştur. Bu değerler genellikle iyi olarak değerlendirilmektedir. Pınardan elde edilen renklerin sürtünme haslık değerleri her iki metotta da 1-2 ve 3-4 olarak bulunmuştur. Bu değerler de genellikle iyi ve orta düzeydedir. Su damlası (kuru ve ıslak) haslık değerleri ise her iki metotta da 3-4 ve 5 olarak bulunmuştur.

Anahtar Kelimeler: bitkisel boyacılık, pinar, mordan, halı, kilim

Introduction

In vegetable dying, plants used for obtaining dye have varied as regional. This is affected from ecological conditions and flora of region. There are some plants used for dying in a certain region, but the same plants are not found the in other regions or they are not used for dying. One of these plants used for dying locally is rockrose (*Cistus laurifolius* L.). Rockrose is used for vegetable dying in Afyon Province in Turkey.

It is known as ildon or pinar in some regions of Anatolia. Rockrose is a plant of class Pareitales, family *Cistaceae*, genus *cistus* L. It is a bush that grows up to 1.5-2 m high. Young leaves are downy and adhesive. Leaves are 3-7 cm long, egg-lance shaped. Generally, leaf edges are undulated. The leaves have long stems. In this genus of rockrose the upper side of the leaf is without down, adhesive and in the color of green. The lower side of the leaf is gray-downy and adhesive. Its flowers diameter is 3-7 cm wide. Its petal is in the color of white and the bottom of the petal is yellow. It has downy sepal that is 3 pieces. Its fruit has downs, which have a resinous secretion (Kayacık 1966).

Rockrose has been spread over around Mediterranean region. It has been frequently seen in various forest regions of Anatolia, especially in open spaces of Scotch fir (*Pinus nigra*) forests. It covers these open spaces. This genus of rockrose is highly penetrated into inner part of the shore (Kayacık 1966). In addition, rockrose has been spread over in the steppes of Internal Anatolia and in the shore of mountains. It has been seen in open spaces of Scotch fir (*Pinus nigra*) and Scotch pine (*Pinus alba*) forests of Internal Anatolia. It grows in side of Bursa-Uludağ (in 500 m high), Bilecik-Abaslık Mountain (in 700-600 m high), Pine forests of İzmir-Çıplak Mountain (in 800-1200 m high), Manisa Mountain (in 500-800 m high), in south Toros Mountains, Konya-Akşehir-Sultan Mountains (in 1500-1600 m high) etc. (Karamanoğlu 1974).

In the past this plant was used for treatment of dysentery and as expectorant. Today, it is used only in cosmetic for perfumes (Tanker et al. 1998). The leaves of rockrose was used for treatment of diabetes in the form of fusion (2%) (Baytop 1999). Although it is used for

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dying of wool carpet yarns locally, there is no research about its usage as dye matter.

In this research, rockrose was taken at the rate of 100% in accordance with wool weight and totally 31 dyings were done with mordant and without mordant. Mordant ratio was taken at the rate of 3% and 5% in accordance with wool weight. Also Pbc mordant, that gives the best color, is mixed with the other mordants separately in equal ratio (1.5% +1.5% totally 3%). In this way 14 dyings were done too. In this study, by doing totally 45 dyings, a catalogue of colors obtained from rockrose was formed and light, friction and water drop wet-dry fastness values were studied. Thus, resistances of colors obtained from rockrose were determined. It has been aimed that, a guide is formed for carpet makers that used vegetable dyed wool yarns.

Material and Method

The materials of this research are rockrose (*Cistus laurifolius* L.), wool carpet yarns (2,5 Nm and without dyed or white) and 15 mordants. These mordants are as follows: alum of aluminum (Aa), copper sulfate (Cs), zinc chlorur (Zc), ferro-sulfate (Fs), tinyclorur (Tc), callium chloride (Cc), alum of crome (Ac), potassium-bicromate (Pbc), potassium- hydroxide (Ph), sodium-hydroxide (Sh), sodium-chlorur (Scl), sodium-sulfate (Ssa), sodium-sulfite (Ssi), potassium-bitartarate (Pbt) and tannin (Tn).

Mordanting wool carpet yarns: Pre-mordanting method was applied for mordanting wool carpet yarns. Mordants are used in two different ways. One of them is to take one mordant alone at the rate of 3% and 5%. Second of them is to take two mordant by mixing in equal amount (1.5%+1.5%, totally 3%).

Firstly, wool carpet yarns were mordanted with mordants by each one separately pointed out in the Material section. For this aim, mordant was taken in accordance with wool weight at the rate of the 3% and 5%. Mordant was melted in the one-liter tepid water. Then, previously damped wool yarn was boiled in mordanted water for one hour. At the end of the time mordanted wool yarn that was taken out of the water was squeezed and prepared for dying.

Secondly, after dyings were done, it was determined that Pbc mordant given the best color. Then it was taken as fixed mordant (at the rate of 1.5%) and mixed with the other mordants separately (at the rate of 1.5%), in equal amounts (totally 3%) in accordance with wool weight. Mordant mixture was melted at the rate of 1/50 in tepid water. Damped wool yarn was boiled in the mordanted water for one hour. At the end of the time mordanted wool yarn that was taken out of the water was squeezed and prepared for dying.

Preparation of dye extract: To obtain the penetration of dye matter to water, dried rockrose plant was broken up into small pieces. Rockrose was taken in accordance with wool weight at the rate of the 100%. Pure

water was used in accordance with wool weight at the rate of the 1/50. And then plant pieces were boiled in this water for one hour. At the end of time plant remnants were filtered and putted away from the water. In this way dye extract was obtained.

Dyeng without mordant: Previously damped wool yarn was boiled in dye extract for one hour. During the boiling decreased water is added equal to vaporized amount. Then it was cooled, rinsed with cold water and dried at shading and airy place.

Dyeng with mordant: Mordanted wool yarn was boiled in the previously prepared dye extract for one hour. Then, it was cooled, rinsed with cold water and dried at shading and airy place.

Naming the colors: Naming obtained colors was arranged subjectively. Obtained colors with these methods were named by the commission consisted of specialists of Ankara University Agricultural Faculty Home Economics Department. For the naming, dyed wool yarn samples were spread on a white ground where the sunlight comes from the side and they formed into groups according to their colors and tone differences. And also Harmancıoğlu (1955) was considered for the naming of the colors.

Light fastness determination: Light fastness determination was done according to TS 867 prepared by TSE (For Dyed or Pressed Textiles Color Fastness Testing Methods- Color Fastness Determination Methods Facing Sunlight) (Anonymous 1984a) and DIN 5033 (Fabmessung Begriffe der Fabmetrik) (Anonymous 1970).

Friction fastness determination: Friction fastness determination was done according to TS 717 prepared by TSE (For Dyed or Pressed Textiles Color Fastness Determination Methods- Determination of Color Fastness According to Friction) (Anonymous 1978) and TS 423 (Using Methods of the Gray Scale for Sum up the Staining "leaking of dye " and Discoloring "Chancing of Color", in the Determination of Color Fastness of Textiles) (Anonymous 1984b).

Water drop fastness determination: Water drop fastness determination was done according to TS 339 prepared by TSE (Color Fastness Determination Facing Water Drop) (Anonymous 1978b) and TS 423 (Using Methods of the Gray Scale for Sum up the Staining "leaking of dye " and Discoloring "Chancing of Color", in the Determination of Color Fastness of Textiles) (Anonymous 1984b).

Results and Discussion

The colors obtained from rockrose: The colors obtained from rockrose by two different pre-mordanting application were seen Table 1, 2.

Analyzing Table 1, it is seen that dark greenish yellow, ooze olive oil color, dried oak leaf color, cumin, light chick yellow, light earth color, honey yellow color, reddish-milky brown, dirty yellow, straw yellow colors are obtained from rockrose by pre-mordanting method at rate of 3%. Light greenish yellow, ooze olive oil color, greenish

yellow, dark earth color, light earth color, chick yellow, mustard, reddish-milky brown, milky brown, dirty yellow colors are obtained from rockrose by pre-mordanting method at rate of 5%. Also, dried oak leaf color is obtained from rockrose by without mordanting dyeng method.

Analyzing Table 2, it is seen that the mustard and its light and dark tones, light tobacco, dark greenish yellow colors are obtained from rockrose by mixing fixed Potassium-bicromate (Pbc) mordant with the other mordants. These colors can be used in hand made carpets and rugs widely.

Light, friction and water drop fastness values of the colors obtained from rockrose: Fastness is resistance of a color against to outer effects. It is important for textile industry that fastness values are to be in good level. The most desired fastnesses in carpets are light friction and water drop fastnesses. Blue wool scale and gray scale are used for appreciating of fastnesses.

Blue wool scale is used for light fastness and appreciated between 1 and 8. It shows that the first one is the lowest degree, and the 8th one is the best degree. Gray scale is used for all the other fastness appreciation between 1 and 5. And it shows that the first one is the lowest degree, and the 5th one is the best degree.

Light, friction and water -drop fastness values of the colors obtained from rockrose are shown in Table 3, 4.

Analyzing Table 3, it is seen that, the value of light fastness is between 2 and 8 by pre-mordanting method at the rate of 3%, 5% and without mordant. The Zc and Tc mordants give the lowest value of 2 at the rate of 5%. Cs (3%), Pbc (3%), Ssi (5%) and Pbt (5%) mordants give the highest value of 8. Light fastness values of the colors obtained from rockrose with the other mordants are good and middle and it is found as 5 without mordant. In general, light fastness values of colors obtained from rockrose are in good level by pre-mordanting method at the rate of 3%, 5%.

Also from the Table 3, it is seen that the values of friction fastness changes between 1-2 and 3-4. While the lowest value, 1-2, isobtained from Tc mordant at the rate of 3%, the highest value, 3-4, is taken form Ph (5%), Sh (3%), Sc (3-5%), Ssa (3-5%), Ssi (3%), Pbt (3%) and Tn (3%) mordants respectively. In general, these values are middle.

From the same table it is seen that the values of water drop fastness change between 3-4 and 4-5. Tcmordant at the rate of 5% gives the value of 4-5. The other mordants give the value of 5 for dry water drop fastness. These values both dry and wet water drop fastness are in good level.

Analyzing Table 4, it is seen that, light fastness values of the colors obtained from rockrose by mixing fixed Potassium-bicromate (Pbc) mordant with the other mordants change between 4 and 8. The value of 4 is obtained from Pbc + Fs, Pbc+Ph, Pbc+Sh mordant

Table 1. Colors obtained from rockrose by pre-mordanting

Name of the mordant	Mordant rate (%)	Obtained colors
Alum of aliminium	3	Dark greenish yellow
	5	Light greenish yellow
Copper sulfate	3	Ooze olive oil color
	5	Ooze olive oil color
Zinc clorur	3	Dried oak leaf color
	5	Greenish yellow
Ferro sulfate	3	Cumin
	5	Dark earth color
Callium chloride	3	Dried oak leaf color
	5	Light earth color
Tinaryclorur	3	Light chick yellow
	5	Chick yellow
Alum of crome	3	Light earth color
	5	Greenish yellow
Potassium bicromate	3	Honey yellow color
	5	Mustard
Potassium hydroxide	3	Reddish-milky brown
	5	Reddish-milky brown
Sodium hydroxide	3	Reddish-milky brown
	5	Reddish-milky brown
Sodium clorur	3	Dirty yellow
	5	Milky brown
Sodium sulfate	3	Light earth color
	5	Milky brown
Sodium sulfite	3	Dried oak leaf color
	5	Milky brown
Potassium bitartrate	3	Straw yellow
	5	Dirty yellow
Tannin	3	Dried oak leaf color
	5	Milky brown
Without mordant	-	Dried oak leaf color

Table 2. Colors obtained from rockrose by mixing fixed Potassium-bicromate (Pbc) mordant with the other mordants

Name of the mordant	Mordant rate (%)	Obtained colors
Pbc + Alum of aliminium	1.5+1.5	Mustard
Pbc + Copper sulfate	1.5+1.5	Dark mustard
Pbc + Zinc clorur	1.5+1.5	Dark mustard
Pbc + Ferro sulfate	1.5+1.5	Light tobacco
Pbc + Callium chloride	1.5+1.5	Light mustard
Pbc + Tinaryclorur	1.5+1.5	Mustard
Pbc + Alum of crome	1.5+1.5	Dark mustard
Pbc + Potassium hydroxide	1.5+1.5	Light mustard
Pbc + Sodium hydroxide	1.5+1.5	Dark greenish Yellow
Pbc + Sodium clorur	1.5+1.5	Light mustard
Pbc + Sodium sulfate	1.5+1.5	Light mustard
Pbc + Sodium sulfite	1.5+1.5	Light tobacco
Pbc + Potassium bitartrate	1.5+1.5	Light mustard
Pbc + Tannin	1.5+1.5	Light mustard

Table 3. Light, friction and water-drop fastness values of the colors obtained from rockrose by pre-mordanting method at rate of 3%, 5%

Name of the mordant	Mordant rate (%)	Light Fastness	Friction fastness	Water drop fastness	
				Wet	Dry
Alum of aluminium	3	5	3	3-4	5
	5	5	2-3	4-5	5
Copper sulfate	3	8	2-3	4	5
	5	5	3	3-4	5
Zinc chlorur	3	4	3	4-5	5
	5	2	2-3	4	5
Ferro sulfate	3	6	3	3-4	5
	5	6	2	4	5
Callium chloride	3	5	3	3-4	5
	5	3	3	3-4	5
Tinyclorur	3	6	3	4	4-5
	5	2	1-2	4-5	5
Alum of crome	3	5	3	3-4	5
	5	3	2-3	4	5
Potassium bicromate	3	8	3	4-5	5
	5	7	3	4-5	5
Potassium hydroxide	3	4	3	4	5
	5	5	3-4	4-5	5
Sodium hydroxide	3	6	3-4	3-4	5
	5	4	3	4	5
Sodium chlorur	3	4	3-4	3-4	5
	5	4	3-4	4	5
Sodium sulfate	3	6	3-4	4	5
	5	6	3-4	4	5
Sodium sulfite	3	7	3-4	4	5
	5	8	3	3-4	5
Potassium bitartarate	3	5	3-4	4	5
	5	8	3	3-4	5
Tannin	3	4	3-4	3-4	5
	5	5	3	3-4	5
Without mordant	-	5	3	3-4	5

mixtures. The highest value, 8, is obtained from Pbc+Tc, Pbc+Ssa, and Pbc+Ssi mordant mixtures respectively. It has been found that, by fixed Pbc mixing the other mordants in equal ratios the highest light fastness values are determined.

Also from the Table.4, when the friction fastness values are analyzed, it is seen that, the values change between 2 and 3-4. While the lowest value of 2 is obtained from Pbc+Fs mordant mixture, the highest value of 3-4 is taken from Pbc+Tc, Pbc+Ssi, Pbc+Pbt mordant mixtures, respectively. These values are generally in good level.

In addition, the values of wet water drop fastness change between 3-4 and 4-5. These values are good and middle. Dry water drop fastness values are found as 5 except for Pbc+Sc and Pbc+Ssa mordant mixtures (3-4). These values are good.

Conclusion

In this research, very different kinds of colors were obtained from rockrose. When mordants were used alone at the rate of 3% and 5%, very different kinds of colors were obtained from rockrose such as yellow, earth color, mustard, cumin and tones. Mustard, tobacco and yellow tones were obtained by mixing fixed Pbc with the other mordants separately. These colors are desired and used preferably in hand woven carpets and rugs. Due to these good colors it has been recommended that rockrose can be used in vegetable dyng.

If the light fastness values of the colors obtained from rockrose were examined, it was understood that when mordants were used alone, light fastness values were between 2 and 8 generally. They were in the middle level. However, they changed between 4 and 8 by mixing fixed Pbc with the other mordants separately. They were generally in the good level. If rockrose is compared to the other dye plants, its light fastness values are better than these such as garden sage if the friction fastness values of the colors obtained from rockrose were examined, it was understood that they were between 1-2 and 3-4 generally. These values were in the middle or good level.

Table 4. Light, friction and water-drop fastness values of the colors obtained from rockrose by mixing fixed potassium bicromate (Pbc) mordant with the other mordants

Name of the mordant	Mordant rate (%)	Light fastness	Friction fastness	Water drop fastness	
				Wet	Dry
Pbc + Alum of aluminium	1.5+1.5	5	2-3	4	5
Pbc + Copper sulfate	1.5+1.5	6	2-3	4-5	5
Pbc + Zinc chlorur	1.5+1.5	6	2-3	3-4	5
Pbc + Ferro sulfate	1.5+1.5	4	2	3-4	5
Pbc + Callium chloride	1.5+1.5	6	3	3-4	5
Pbc + Tinyclorur	1.5+1.5	8	3-4	4	5
Pbc + Alum of crome	1.5+1.5	5	3	4-5	5
Pbc + Potassium hydroxide	1.5+1.5	4	3	3-4	5
Pbc + Sodium hydroxide	1.5+1.5	4	3	3-4	5
Pbc + Sodium chlorur	1.5+1.5	6	3	3-4	4-5
Pbc + Sodium sulfate	1.5+1.5	8	3	4-5	4-5
Pbc + Sodium sulfite	1.5+1.5	8	3-4	3-4	5
Pbc + Potassium bitartarate	1.5+1.5	6	3-4	3-4	5
Pbc + Tannin	1.5+1.5	6	3	4	5

The water drop wet fastness values of the colors obtained from rockrose were between 3-4 and 5 generally. It was seen that while wet water drop fastness values were in the middle and good level, water drop dry fastness values were in the good level too.

Consequently, it has been considered that rockrose in respect of color tones and fastness values can be suitable for dyers and carpet makers.

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