

Anatomy of the Barks of *Rhus coriaria* L.

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Abstract: The genus *Rhus* L. (*Anacardiaceae*) has some 150 species all over the world and is represented by *Rhus coriaria* L. in Turkey. In this study, the anatomy of the cortex of this species was investigated.

Anatomical study of the branch cortex revealed taht large secretory canals containing essential oil occur in one row around the cortex. These canals are supported by a group of sclerenchyma cells. These characteristic elements were inllustrated.

Key Words: *Rhus coriaria* L., Sumac, barks, anatomy

Rhus coriaria L.'nin Kabuk Anatomisi

Özet: Yeryüzünde 150 türü bulunan *Rhus* L. cinsinin Türkiye'de yetişen tek türü *Rhus coriaria* L.'dir. Bu çalışmada türün kabuk anatomisi incelenmiştir.

Anatomik çalışma uçucu yağ taşıyan geniş salgı kanallarının kabuğu bir halka şeklinde kuşattığını ortaya koymuştur. Bu kanalların etrafını bir grup sklerenkima demeti kuşatmaktadır. Salgı kanalları ve sklerenkima demetleri karakteristik olarak görülmektedir.

Anahtar Sözcükler: *Rhus conriaria* L., Sumak, kabuk, anatomi

Introduction

Rhus coriaria L. (*Anacardiaceae*) is a 1-3 m high shrub or small tree. The leaves are imparipinnate with 9-15 leaflets. The inflorescence is a compact and erect panicle, the flowers small and greenish white. The fruit is a villose, reddish, 1-seeded drupe. It is found growing naturally in Aegean, Mediterranean, Southeast, Central and Northern regions of Turkey (1).

The leaves contain gallo-tannins (2, 3), gallic acid (3, 4), flavonoids (2, 4) together with biflavonoids (5), sugars (2), wax (2) and volatile oil (6, 7). The leaves have been utilized in folk medicine for mouth and throat diseases (2). They are also utilized as a tanning agent in the leather industry and are exported for this purpose (2-8).

The fruits contain tannins (2), volatile oil (6, 7), various organic acids (2), anthocyanins (6) and fixed oil (6). Either the whole fruit or only the pericarp is used as a condiment in Turkey and called "Sumak" (2, 9). The composition of the essential oils prepared from the fruit, leaves and branch barks of *R. coriaria* has been reported on the same Anatolian material (7).

The anatomical characters of the leaves and fruit have also been determined in a previous study (10). In this paper the cross section of the branch barks of *R. coriaria* is reported. Some drawings and photographs are also given.

Materials and Methods

The research material were collected from C4 Mersin: Mut to Ermenek, Çamlıca village, 450 m, 13.ix.1988, *M. Koyuncu & A. Köroğlu (Güvenç)* (AEF 14060); 18.vi.1994, *A. Güvenç & U. Güvenç* (AEF 18606).

Voucher specimens were deposited in the Herbarium of Ankara University, Faculty of Pharmacy (AEF). The material used for the anatomical studies was preserved in 70° ethanol. Cross sections of branch barks (longitudinal and transverse) were prepared from alcoholic material and boiled in chloral hydrate and Sartur reagents (11). Illustrations were made using a Leitz drawing prism attached to a Leitz-Wetzlar (45°) microscope. The cross sections were photographed with an automatic camera atatched to a Carl Zeiss Jena microscope.

Results

Illustrations of branch cross sections indicate that there is a layer of cork outermost. Below that is the cortex parenchyma, which contains secretory canals in one row, surrounding the cortex in a circle and an arc of sclerenchyma accompanying each canal. There may be smaller secretory canals scattered close to the cambium without sclerenchyma. Cambium, primary and secondary xylem, annual ring and rays characterize the wood (Fig. 1). The pith contains cluster crystals calcium oxalate.

Anatomical examination of the cortex revealed that bark parenchyma and phloem can easily be seen below the regularly arranged cork cells. Cork cells are thin-walled, almost isodiametric and in numerous rows. Cortex parenchyma cells are polygonal in shape, thin-walled and do not have intercellular spaces (figs. 2, 3). Parenchyma cells contain cluster crystals of calcium oxalate and starch (Figs. 3, 5).

In the cortex parenchyma, arc forming sclerenchyma bundles are present. At the cambium facing sides of

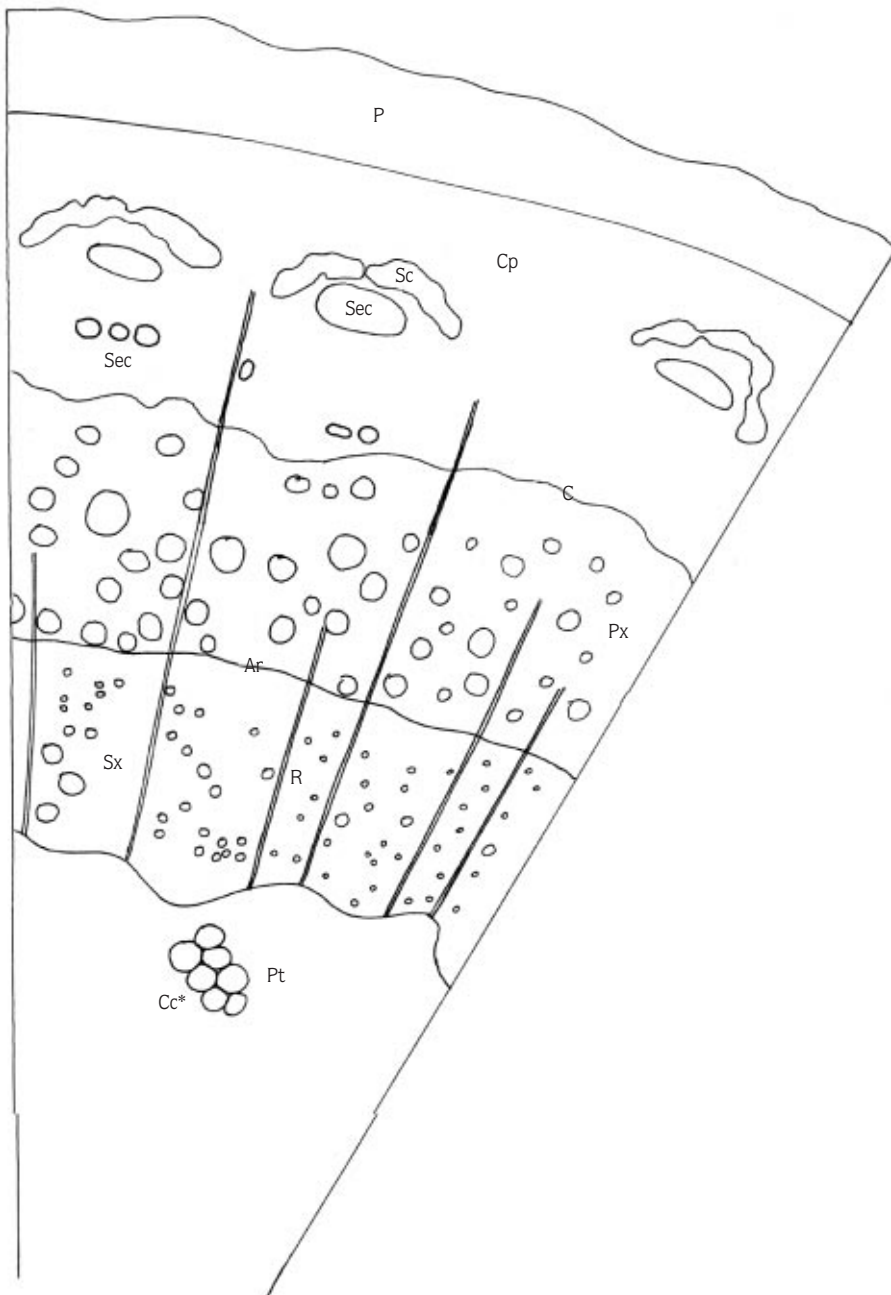


Figure 1. Cross section of *R. coriaria* branch. (P): Periderm, (Sc): Sclerenchyma, (Sec): Secretory canals, (Cp): Cortex parenchyma, (C): Cambium, (Px): Primary xylem, (Ar): Annual ring, (Sx): Secondary xylem, (R): Ray, (Pt): Pith, (Cc)-Cluster crystals of calcium oxalate.

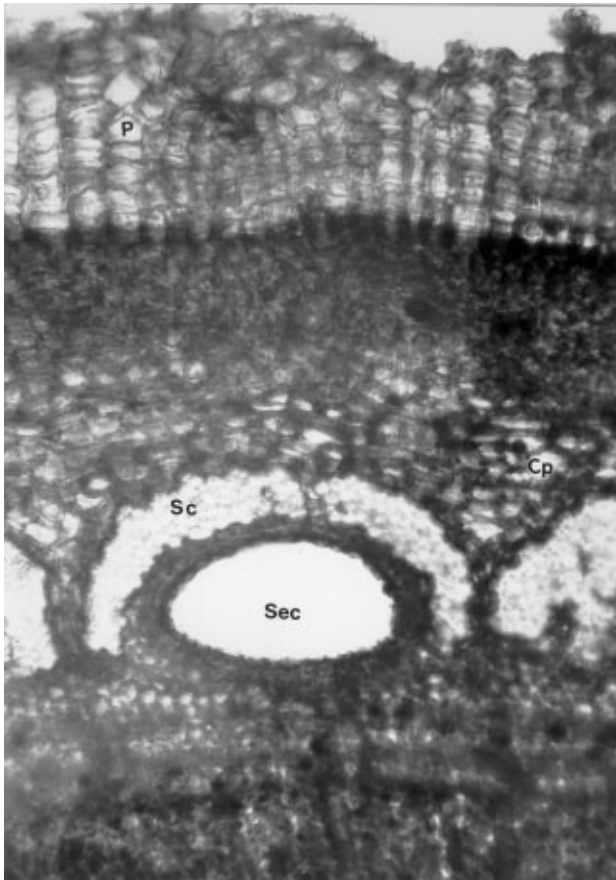


Figure 2. Cross section of *R. coriaria* bark (P): Periderm, (Sc): Sclerenchyma, (Sec): Secretory canals, (Cp): Cortex parenchyma

sclerenchyma bundles secretory canals can be seen. Sclerenchyma bundles surround the secretory canals like a semicircle. The cells between the secretory cells and sclerenchyma bundles are congested. Therefore, these cells do not have a definite shape (figs. 1, 2, 4). Between the secretory canals and cambium, floem is present.

Discussion

In this study the anatomy of the barks including the secretory system of *R. coriaria* was investigated for the first time. Initially, cross sections of the barks of the branch of *R. coriaria* were drawn under low magnification and it was observed that, like *R. trichocarpa* Miq. (12), secretory canals are present in the cortex. In previous studies secretory canals were observed both in the bark and also in the pith of *R. trichocarpa* stem (12). However there are no secretory canals in the pith of *R. coriaria* branches.

Therefore, cortex outside the cambium was anatomically examined and illustrated. The cork facing sides of these canals are supported by sclerenchyma bundles like a semicircle. These surrounding secretory canals and sclerenchyma bundles were determined as the characteristic elements of the bark.

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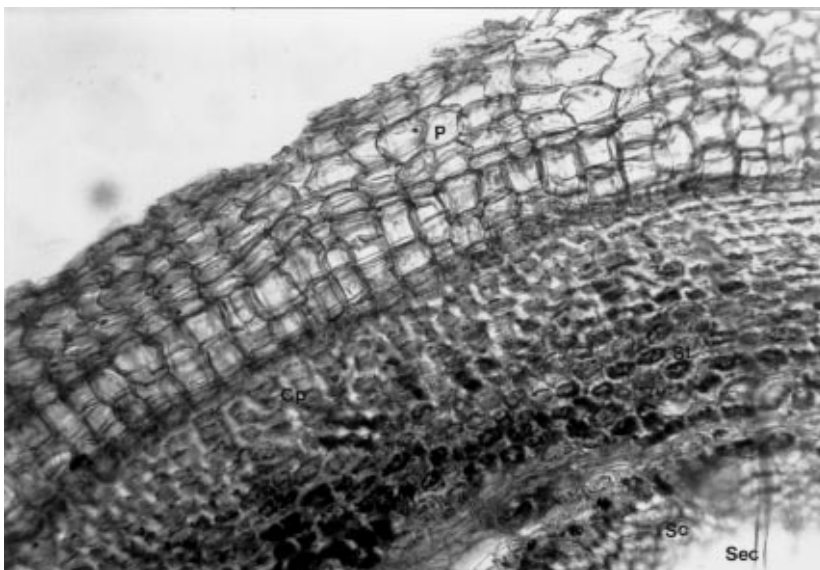


Figure 3. Cross section of *R. coriaria* bark. (P): Periderm, (Cp): Cortex parenchyma, (St): Starch, (Sc): Sclerenchyma, (Sec): Sactory canals.

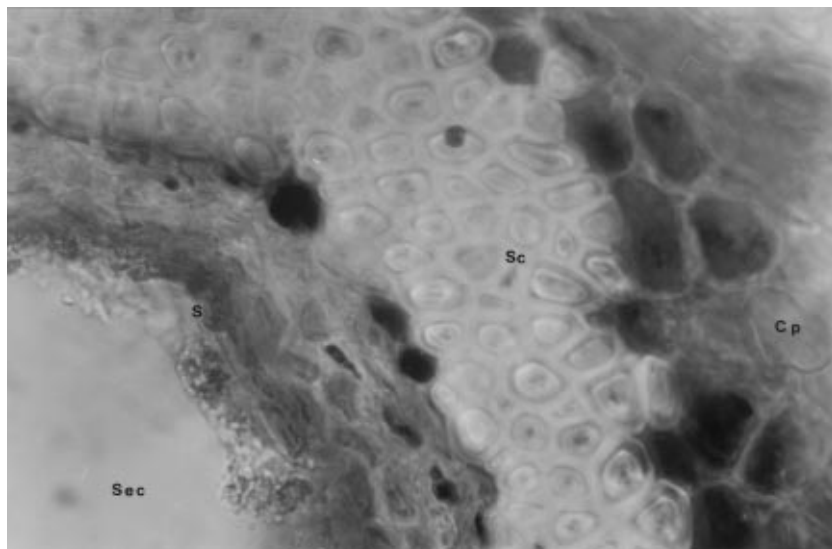


Figure 4. Cross section of *R. coriaria* bark. Cp- Cortex parenchyma, Sc- Sclerenchyma, S- Secretory cells Sec- Secretory canal

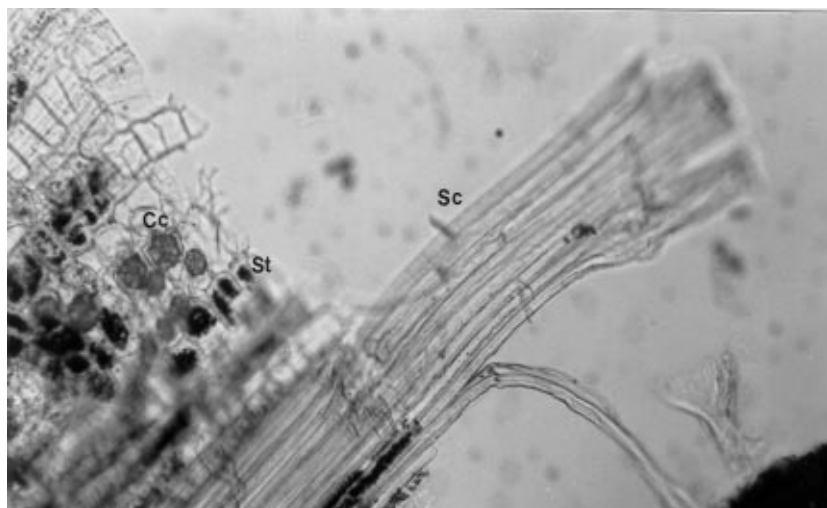


Figure 5. Longitudinal section of *R. coriaria* bark. Cc- Cluster crystals of calcium oxalate, St- Starch, Sc- Sclerenchyma.

References

1. Davis, P.H.: Flora of Turkey and the Aegean Islands. Vol. 2, University Press, Edinburgh, 1967.
2. Baytop, T.: Türkiye'de Bitkiler ile Tedavi. I. Ü. Eczacılık Fakültesi Yayınları, İstanbul, 1984.
3. El Sissi, H.I., Ishak, M.S., Abd El Wahid, M.S.: Polyphenolic components of *Rhus coriaria* leaves. *Planta Med.*, 21(1), 67-71, 1972.
4. El Sissi, H.I., Saleh, N.A.M., Abd El Wahid, M.S.: The tannins of *Rhus coriaria* and *Mangifera indica*. *Planta Med.*, 14(2), 222-31, 1966.
5. Van Loo, P., De Bruyn, A., Verzele, M.: Liquid chromatography and identification of the flavonoids present in the "Sumach tannic acid" extracted from *Rhus coriaria*. *Chromatographia*, 25(1), 15-20, 1988.
6. Güvenç, A., Koyuncu, M.: A study on the main active compounds of leaves and fruits of *Rhus coriaria* L. *Tr. J. of Medical Sciences*, 20(1), 11-13, 1994.
7. Kurucu, S., Koyuncu, M., Güvenç (Kıroğlu), A., Başer, K.H.C., Özek, T.: The Essential Oils of *Rhus coriaria* L. (Sumac). *J. Essential Oil Res.*, 5(5), 481-486, 1993.

8. Baytop, T., Tanker, N.: Türkiye'nin Bitkisel Drog İstihali, A. Ü. Eczacılık Fakültesi Mecmuası, 2, 60, 1972.
9. Tanker, M., Tanker, N.: Farmakognozi. Cilt 1, A. Ü. Eczacılık Fakültesi Yayınları, No: 58, Ankara, 1985.
10. Koyuncu, M., Köroğlu, A.: *Rhus coriaria* L. Yaprak ve Meyvalarının Anatomik İncelenmesi. Doğa Türk Eczacılık Dergisi, 1(2), 89-96, 1991.
11. Çelebioğlu, S., Baytop, T.: Bitkisel tozların tetkiki için yeni bir reaktif. Farmakognozi Enstitüsü Yayınları, No. 10, Farmakolog 19, 301, 1949.
12. Metcalfe, C.R., Chalk, L.: Anatomy of the Dicotyledons. Vol: 1, Oxford: Clarendon Press, Oxford, 450-461, 1965.