

**ANATOMICAL AND PRELIMINARY CHEMICAL
STUDIES ON THE LEAVES OF *Cotinus coggyria* Scop.
(Anacardiaceae)**

Ş. KÜLTÜR¹, L. BİTİŞ²

S U M M A R Y

Cotinus coggyria Scop. is well-known with vernacular names "tetra, tetre, tetere" and used different medicinal purposes commonly by local people in Kırklareli. The leaves of *C. coggyria* are bifacial and hypostomatic. It has glandular (unicellular stalk-multicellular head) and nonglandular (simple, unicellular) hairs on the leaves. It is observed many druses (cluster crystals) and a few prismatic crystals. Stomata amount is 250 per mm² on the lower surface of the leaves. The tannin, flavonoid, mucilage content of the leaves was determined.

Ö Z E T

Cotinus coggyria Scop. Kırklareli bölgesinde çeşitli hastalıkların tedavisinde kullanılan ve bölgede 'tetre, tetra, tetere' yöresel isimleriyle çok iyi tanınan bir bitkidir. *C. coggyria*'nın yaprakları bifasyal ve hipostomatiktir. Yapraklarda örtü (basit, tek hücreli) ve salgı (sapı tek-başı çok hücreli) tüyleri görülür. Çok sayıda druz, nadiren

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¹ Department of Pharmaceutical Botany, Faculty of Pharmacy, Istanbul University, 34116, Beyazıt, Istanbul

² Department of Pharmacognocny, Faculty of Pharmacy, Marmara University, 34668, Haydarpaşa, Istanbul

prizmatik kristal bulunur. Yaprak altyüzünde 1 mm² de 250 stoma vardır. Ayrıca çalışmamızda flavon, tanen ve müsilaj içerikleri de belirlenmiştir.

Key words: *Cotinus coggyria*, Anacardiaceae, leaf anatomy, Kırklareli (Turkey)

INTRODUCTION

During the project named "An Ethnobotanical Study in Kırklareli" supported by Istanbul University Research Fund, it was observed that the plant named "tetra, tetre, tetere" locally in Kırklareli around was known and used commonly by local people is *Cotinus coggyria* Scop. The genus *Cotinus* includes 3 species distributed through southern Europe to the Himalayas and China (*C. coggyria*), southeastern United States (*C. obovatus*) and southwest China (*C. cotinoides*) (1). *C. coggyria* is a commonly cultivated ornamental, particularly its cultivar 'Rubrifolius' (2). In this study it was revealed that the anatomical characteristics of the leaves of *C. coggyria* used medicinally.

MATERIAL AND METHOD

In this study anatomical investigations are made both of *C. coggyria* specimens collected in Kırklareli during the project and specimens previously collected and kept in the Herbarium of Istanbul University Faculty of Pharmacy (ISTE). Anatomical sections were taken manually from the leaf blade of the plants dried and fixed in 70% ethanol, were stained by Sartur reactive. Surfaces sections were taken from upper and lower parts of the leaf epidermis. Photographes were taken by Olympus trinocular BH-2 photomicroscope. The number of stomata in the lower surface was established per mm². Various references were used for anatomical investigations (3-6).

Chemical studies on the leaves: (7, 8)

1-Phytochemical preliminary studies were done on the plant material. These studies were carried on the 5 % infusion and ethanol extract of the plant material. Special extraction method was applied for alkaloid determination.

2-The microscopic investigation of the material with Indian ink showed that it contains mucilage. The swelling index of the material was determined according to the increase in volume in water.

3-The tannin content of the leaves was determined gravimetrically with hide powder adsorption method.

4-The flavonoid content of the leaves was determined with UV spectroscopy according to DAB 10.

RESULTS AND DISCUSSION

Cotinus coggyria Scop., Fl. Carn. 1:220 (1772).

Syn.: *Rhus cotinus* L., Sp. Pl. 267 (1753).

Ic. Bonnier, Fl. Comp. Fr., Suisse et Belge 2:t. 116 (1913) (9).

Deciduous shrub up to 5m. Leaves 3-8cm, petiolate, obovate to broadly elliptic to orbicular, sparsely pilose or glabrescent. Inflorescence 15-20 cm, terminal with long slender branches. Pedicels numerous, many without fruits, all plumose. Sepals 1.5mm, petals 1-2mm whitish-green. Drupe 4-5 x 3-4 mm, obliquely obovate and rugose.

Flowering time: April-June

Habitat and altitude: Scrub, macchie and forest. Sea level-1300m.

Type: Described From Italy (Hb. Linn. 378/27)

Distribution in European Turkey: A1(E) Edirne, Kırklareli, Tekirdağ, A2(E) İstanbul

Distribution in Turkey: Blacksea Region, South-West Anatolia, South and East Anatolia (9)

General Distribution: Southern Europe, Romania, Bulgaria, European Turkey, Anatolia, Crimea, Syria, Caucasus, Pakistan, NW. India, Nepal, S. & C. China

Vernacular names: Sarıboya ağacı, Sarıcan (10), Pamuklu sumak, Sarı yaprak (11), Boyacı sumacı (11-12), Sarısumak (13), Tetre, Tetere (14-17), Çatlağan (18) Tetra (16,17,19), Çitlengiç (20).

Uses in Turkey

Branches and leaves of *C. coggyria* plant were used in various purposes in different places. Leaves and barks are used as antipiretic, antiseptic, antihemorrhagic and for diarrhea with infusion of 5% (10,12,18). In addition stems are used as dye

named "sarı kök" or "sarı odun" in textile industry since the old times preparing yellow, brown and olive green colours and used as dyeing wools, clothes and leathers (10,13). In Tekirdağ the infusion from branches and leaves of this plant is used in stomach pains and the ointment for wound (14). In Kışlak district (Yayladağı-Hatay) the decoction from woods used for cough (20). Also, in Osmaniye-Dörtyol decoction from woods is used in stomach diseases and enteritis.

During the project study in Thrace especially in Kırklareli that the leaves of the plant locally named "tetra, tetre, tetere" and used commonly by local people was suggested. It was also observed that it was sold in the drug markets and open markets. Leaves of the plant have been used for treatment of wounds, diabetes, hypertension, hemorrhoids, kidney stones, stomach ache and cancer (16, 17). Also using as spice in Çatalca area(19).

A- Leaf anatomical characteristics of *C. coggyria* Scop.

Examined specimens: A(1)E Edirne: Uzunköprü-Havza, near Uzunköprü, on road side, 23.VII.1968, A. Baytop, ISTE 14525! Kırklareli: Midye-Vize, 6 km from Midye, in *Quercus* forest, 16.VI.1975, A. Baytop, ISTE 31947!, Çukurpınar-Şükrüpaşa, Karlık Serisi, in *Quercus* forest, 590m, 3.VI.2001, Ş. Kültür, N. Sadıkoğlu, G. Ecevit, ISTE 80171! A(2)E Tekirdağ: Malkara, 11.X.1992, E. Akalın, ISTE 64542! İstanbul: Yıldız Park, 10.VIII.1981, A. Baytop, ISTE 47479!

Leaves are bifacial and hypostomatic.

Epidermis: Single layer of cells are elongated or isodiametric. There is a thick cuticular layer on it and the cells of the upper epidermis are bigger than the lower ones. On the superficial section, walls of the upper epidermal cells are almost straight, the lower epidermal cells are slightly undulate. On the lower surface midrib is obviously convex (Fig. I A,B,C).

Hairs: It has two types (glandular and nonglandular) of hairs. Simple unicellular long hair which thickened cuticular walls are present sparsely on both surfaces. Glandular hairs which consist of unicellular stalk and multicellular heads are found generally on the lower surface.

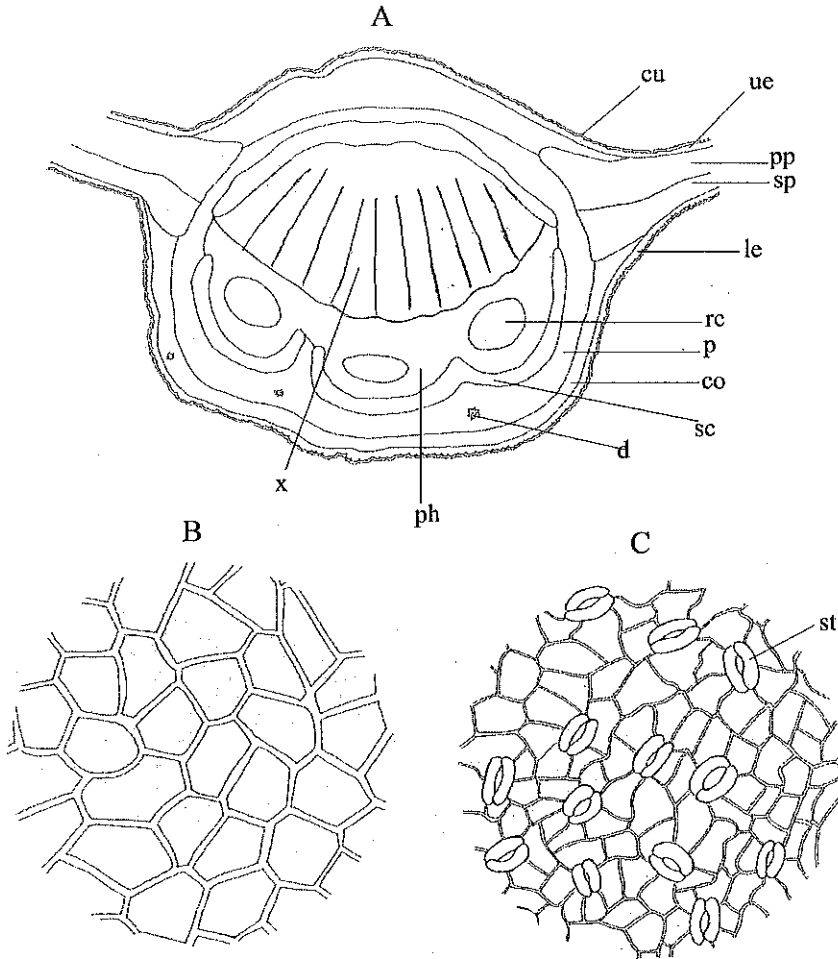


Figure 1. *C. coggyria* (ISTE 80171) A- cross sections of the midrib (x 112.5), B-surface view of the upper epidermis (x 450), C- surface view of the lower epidermis (x 450). co, collenchyma; cu, cuticle; d, druse; ue, upper epidermis; le, lower epidermis; ph, phloem, pp, palisade parenchyma; rc, resin canals; sc, sclerenchyma; st, stomata; x, xylem

Crystals: Numerous druses (cluster crystals) in all tissues. Prismatic crystals are observed rarely (Fig.1, A).

Stomata: Leaves are hypostomatic. The stomata are present only on the lower surfaces of the leaves. They are oblong usually surrounded by 5-7 adjacent cells. On the superficial section, stomata amount is established per mm² 250 on the lower surface (Fig.1, C).

Mesophyll: The palisade parenchyma has two layers in the upper side. The spongy parenchyma has three-four layers. There are no broad intercellular spaces in the mesophyll tissue. The vascular bundle is collateral type. The upper and lower parts of the central vessel are surrounded by two-three layered sclerenchymatous tissue. After the lower epidermis three-four layered collenchyma and the following one or two layered parenchymatic cells are observed. Distinctly large resin canals are found in the phloem (Fig.1, A).

B-Chemical characteristics of *C. coggyria* Scop.

According to the results of chemical investigations done before on *Cotinus coggyria* (21-22);

The flowering leafy branches of the plant contain 0.1 % volatile oil consisting of limonene, camphene and pinene. The leaves contain flavonoids (myricetin, quercetin), leucoanthocyanidins (leucodelphinidin, eucocyanidin) and anthocyan type phenolic compounds (cyanidin, delphinidin, petunidin). Myricetin is the major compound 5-deoxy flavones such as fisetin, fustin and sulfuretin were found in the wood of the plant. The leaves and bark of the plant contain hydrolyzable tannins, whereas the bark contains condensed tannins.

The data below were found as the result of this study:

1-The phytochemical preliminary studies showed that plant material contains flavonoid compounds (red color in Cyanidin test because of flavonols) and hydrolyzable tannins (blue-black precipitate with FeCl₃).

2-The swelling index is 5.5 ml.

3-The tannin content of the leaves is 17 %.

4-The total flavonoid content of the leaves is 1.8 %.

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