

Short communication

MORPHOLOGICAL AND ANATOMICAL INVESTIGATIONS ON THE ROSE HIPS SOLD IN SOME HERBALISTS IN ANKARA

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Abstract

Species of Rosa L. (Rosaceae), which naturally grow in Turkey have a wide distribution and represented by 24 species. The ripened fruit of Rosa consists of achenes and hairs enclosed in fleshy cup shaped hypanthia. The medicinal drug should contain ripened and dried hypanthia of the false fruit largely free of the achenes and hairs and it should contain not less than 0.3 % of ascorbic acid.

The aim of this study is to investigate the morphological and anatomical characters of the rose hip samples (Dog rose, Rosae pseudo-fructus) that are sold by herbalists in Ankara and also to compare their characteristics with standard samples and data in pharmacopoeia to determine suitability of the samples to the pharmacopoeia (specifically European Pharmacopoeia 2008).

According to results of the morphological and anatomical characters of the purchased samples from the herbalists, it has been thought that the samples are most probably Rosa canina, however, it has been seen that the morphological characters of the samples were not suitable to the officinal drug standards in European Pharmacopoeia.

Key words: Rosa, Rosaceae, Rose hip, Herbalist

Ankara'daki Bazı Aktarlarda Satılan Kuşburnu'nun Morfolojik ve Anatomik Olarak İncelenmesi

Türkiye'de doğal olarak yetişen Rosa L. (Rosaceae) türleri geniş bir yayılış göstermekte ve 24 tür ile temsil edilmektedir. Rosa türlerinin olgunlaşmış meyveleri, etlenmiş, kupa şeklinde hipantiyum ve içerisinde bulunan akenler ve tüylerden oluşmaktadır. Offisinal drog, tüylerden ve akenlerden kurtarılmış, olgun ve kuru yalancı meyvelerin hipantiyumlarını içermeli ve içerdiği askorbik asit oranı % 0.3'den az olmamalıdır.

Bu Çalışmanın amacı, Ankara'da aktarlar tarafından satışa sunulan Kuşburnu (Rosae pseudo-fructus) örneklerinin morfolojik ve anatomik özelliklerinin saptanması ve ayrıca bu karakterlerin standartlarla ve Farmakopelerin verileriyle (Özellikle Avrupa Farmakopesi 2008) karşılaştırılması ve onlara uygunluğunun tespit edilmesidir.

Aktarlardan satın alınan örneklerin, morfolojik ve anatomik özelliklerinin sonuçlarına dayanarak, Rosa canina türüne ait olabilecekleri düşünülmüştür. Fakat örneklerin morfolojik özelliklerinin Avrupa Farmakopesindeki offisinal drog standartlarına uygun olmadığı görülmüştür.

Anahtar kelimeler: Rosa, Rosaceae, Kuşburnu, Aktar

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INTRODUCTION

Rosa L. (Rosaceae) genus, which naturally grows in Turkey, represented by 24 species (30 taxon) (1). The false fruit of *Rosa* consists of achenes enclosed in fleshy cup shaped hypanthia. The medicinal drug (Dog rose, *Rosae pseudo-fructus*), according to DAB 10 and European Pharmacopoeia 2008, consists of ripe, opened and dried hypanthia of the false fruit (the hip) largely freed of the fruit (pips) and hairs attached to the receptacle. According to the literature, dried drug should contain not less than 0.3 % of ascorbic acid, (2, 3). Rose hips are usually obtained from *Rosa canina* L., *R. pendulina* L. and some other *Rosa* species (3). The dried hypanthias of *R. canina* contain high amount of ascorbic acid ranging from 0.5 to 1.7 %, besides sugars, pectins, essential oil, organic acids, tannins, carotenoids and trace of flavonoids and anthocyanin derivatives (3-7). In a study, completed in Turkey previously, Coşkun et. al. determined the amount of ascorbic acid ranging from 0.15 to 1.25 % in hypanthia of 7 species of *Rosa* L. genus growing in Turkey (5).

Hypanthia of *Rosa* in other words Rose hips are well known as a source of vitamin C in all over the world. It is used for colds, relieving digestive complaints, gallstones, to heal subacidic-stomach and in infectious diseases, in conditions of the efferent urinary tract, edema, rheumatism, gout, for the prevention and treatment of vitamin C deficiency, to stop bleeding and leucorrhoea in folk medicine (3, 6, 8, 9). This drug is known as “kuşburnu” in Turkey, used to treat a great variety of ailments such as constipation, cold, liver diseases, diabetes and hemorrhoids, also used as tonic in Turkish traditional medicine (4, 10, 11).

In Turkey or in all over the world, it is consumed as marmalade, fruit juice and as tea. Rose hips are collected from nature in small settlements of Anatolia and in big cities the drug is sold in herbalists. Rose hips are commercially available as whole and as powdered drug and commonly used to make herbal tea (5, 7, 12).

R. canina fruits are ovoid to globose, 1-2,5 (-3) cm, yellowish red to pure red, calyx and style remains present and ripening occur in late autumn. The fruits contain white hairy achenes (1, 2, 4). According to the European Pharmacopoeia *Rosae pseudo-fructus* powder is orange-yellow (3).

The aim of this study is to investigate the morphological and anatomical characters of the rose hips (*Rosae pseudo-fructus*) that are sold by herbalists in Ankara and also to compare their characteristics with standard samples and data in pharmacopoeia to determine suitability of the samples to the pharmacopoeia (specifically European Pharmacopoeia 2008).

MATERIALS AND METHODS

In this study, 7 samples from 5 different herbalists in Ankara were collected in 2005 (Fig. 1 a-g) and 2 reference samples, collected from nature were used for the analysis of rose hips sold in herbalists (Table 1).

The morphological properties of the samples and the reference drugs were determined and their photographs were taken (Leica MZ 75). General view of the samples, color, shape, length of the fruit, and ratio of the foreign materials in samples were determined as a morphological study. In order to determine the anatomical characters of the samples, dry hypanthia free from achenes were powdered and the samples were examined under the microscope by using Sartur Reagent (13). Characteristic elements were determined, their figures were drawn (Olympus BX50 microscope attachment to Olympus U-DA 2K 17149 drawing tube) and their micro photographs were taken (Leica DM 4000 B).

Table 1. Examined materials.

Material	Purchase and collection areas
Sample 1a (Fig. 1.a)	Ulus
Sample 1b (Fig. 1.b)	Ulus
Sample 2a (Fig. 1.c)	Kızılay
Sample 2b (Fig. 1.d)	Kızılay
Sample 3 (Fig. 1.e)	Ulus
Sample 4 (Fig. 1.f)	Ulus
Sample 5 (Fig. 1.g)	Yenimahalle
Reference drug 1	A3 Bolu: Abant-Mudurnu road, passage way, 1400 m, 10.10.1992 , M. Coşkun et. al., AEF 16729.
Reference drug 2	A4 Bolu: around Abant lake, 1330 m, 10,10,1992, M. Coşkun et. al., AEF 16731.

RESULTS

a- Morphological Results

The results of the morphological characters of the samples and the references were given in Table 2 (Figure 2 a-i).

Table 2. Morphological characters of samples and standards of the Rose hips.

Sample	General View	Color	Fruit length (cm)	Fruit shape	Foreign materials (%)
1a (Fig. 2.a)	Whole fruit 6,7 % hypanthia pieces 70,3 % <i>Hibiscus</i> flower 23 %	Orange- red or yellowish- red	1.3 - 2.6	Ovoid - globose	30
1b (Fig. 2.b)	Whole fruit	Orange- red or yellowish- red	1.4 - 2.8	Ovoid - globose	50
2a (Fig. 2.c)	Whole fruit	Orange- red or yellowish- red	1.4 - 2.4	Ovoid - globose	44
2b (Fig. 2.d)	Hypanthia pieces 27 % achens 49 % <i>Hibiscus</i> flower 24%	Orange- red or yellowish- red			73
3 (Fig. 2.e)	Whole fruit	Orange- red or yellowish- red	1.2 - 2.3	Ovoid - globose	43
4 (Fig. 2.f)	Whole fruit	Orange- red or red	1.3 - 2.2	Ovoid – globose or elliptic	41
5 (Fig. 2.g)	Whole fruit	Orange- red or yellowish- red	1.2 - 2.2	Ovoid - globose	47
reference 1 (Fig. 2.h)	Whole fruit	Orange- red or yellowish- red	1.4 -2.3	Ovoid or ovoid - globose	41
reference 2 (Fig. 2.i)	Whole fruit	Orange- red or yellowish- red	1.5 - 2.8	Ovoid - globose	40

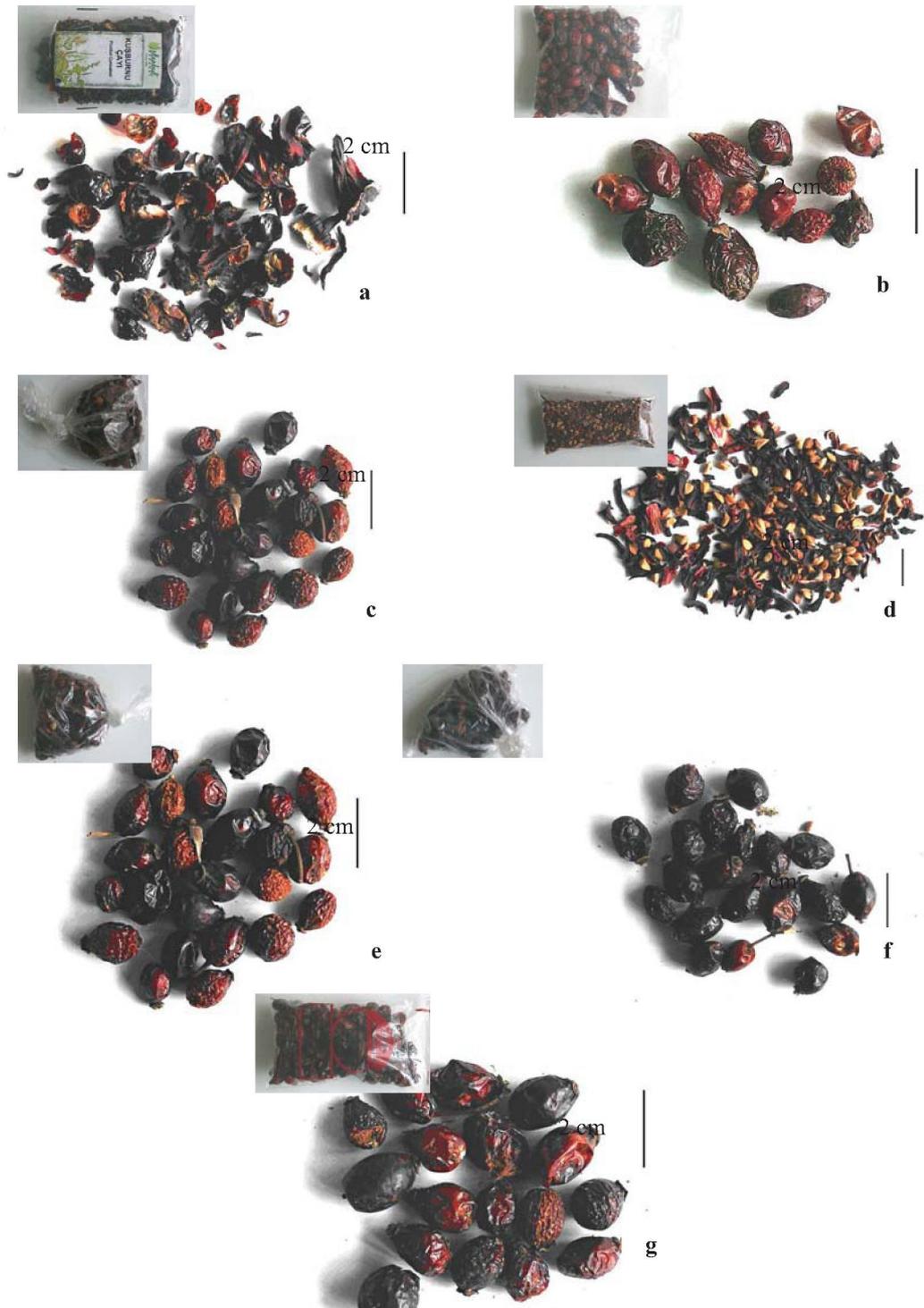


Figure 1. General view of the collected samples, **a.** Sample 1a, **b.** Sample 1b, **c.** Sample 2a, **d.** Sample 2b, **e.** Sample 3, **f.** Sample 4, **g.** Sample 5.

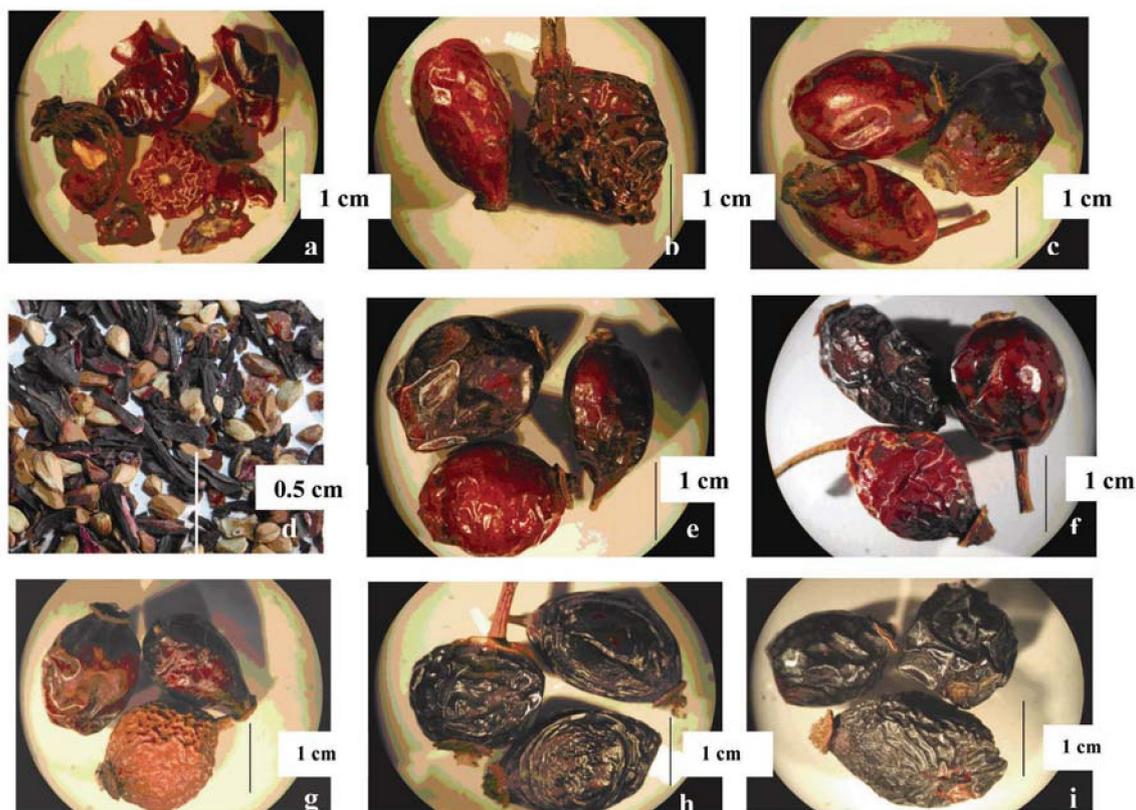


Figure 2. Morphological characters of samples and standards of the Rose hips, **a.** Sample 1a, **b.** Sample 1b, **c.** Sample 2a, **d.** Sample 2b, **e.** Sample 3, **f.** Sample 4, **g.** Sample 5, **h.** Reference 1, **i.** Reference 2.

Sample **1a** consists of coarse pieces, while sample **2b** consists of fine pieces. According to the morphological studies, *Hibiscus* flowers were added to **1a** and **2b** samples. The other samples consist of whole fruits (Table 2, Figs. 1, 2).

While the outer surfaces of hypanthia of all examined samples were glabrous in general, presences of a few (1-5) glandular hairs were recorded in the outer surface of some hypanthia near the fruit stalk (Fig. 3).



Figure 3. The glandular hair on the outer surface of hypanthia

The internal surface of hypanthia, which is less colored than the outer surface, is covered with prickly and small, needles like covering hairs. The sepal residues are present in all mature hypanthia samples.

All the examined powdered samples are heterogeneous, orange-yellow colored, with acidic but pleasant-taste, and their odor is characteristic but somehow resembles to the orange aroma.

b- Anatomical Results

Powdered samples were examined by the microscope and the properties of their elements were described. In addition, their figures and photographs were illustrated (Figs. 4-15).

b-1. External Epidermis of Hypanthia: External epidermis consists of thick walled cells. One of the walls of the cell is thinner than the others (Fig. 4). Presence of a few multicellular, pointed apex and thin walled simple covering hairs were recorded (Fig. 5). Also a few multicellular and multi-rowed stalked and multicellular headed glandular hairs were observed (Fig. 6). The epidermal base cells of glandular hairs were circular in shape (Fig. 7).

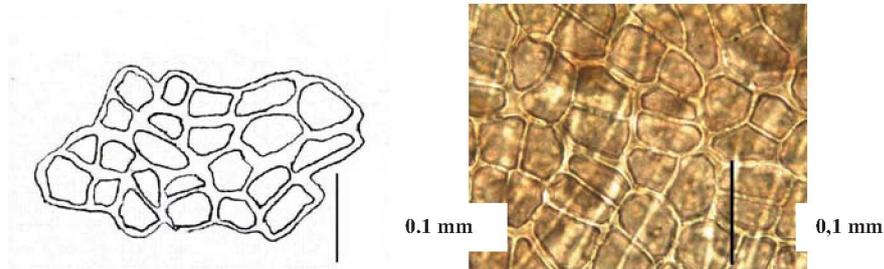


Figure 4. External epidermis cells

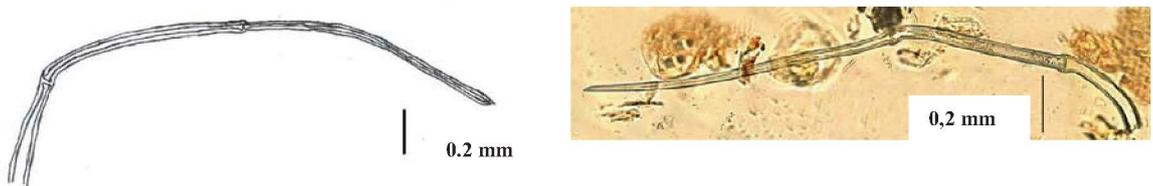


Figure 5. Multicellular covering hair

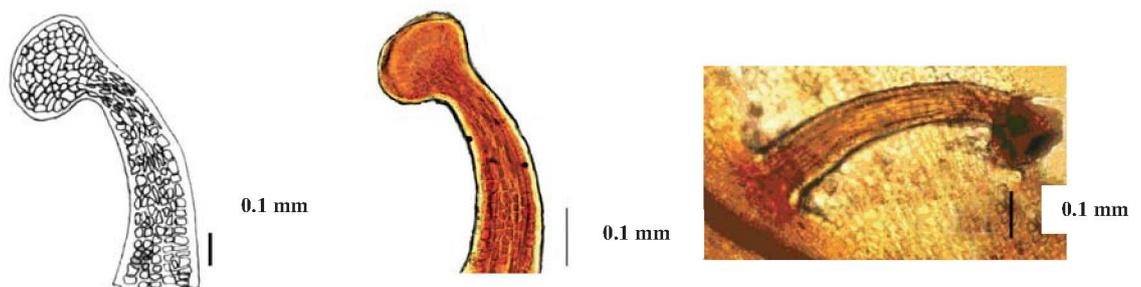


Figure 6. Glandular hair

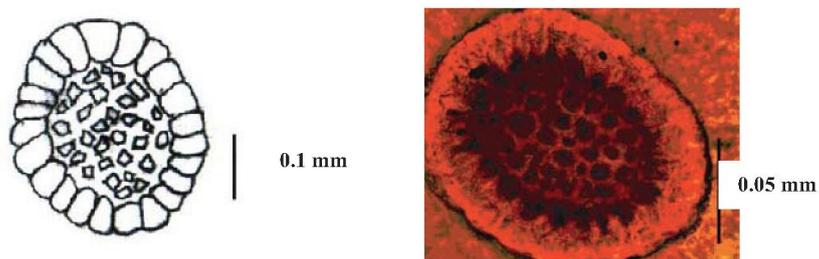


Figure 7. Base cells of glandular hair

b-2. Parenchymatic Region of Hypanthia: This region consists of multilayered parenchyma which was divided into 2 layers.

b-2.a- Underneath the epidermis there is one parenchymatic layer consisting of thick walled cells. These cells contain orange-red carotene pigments and a few but large druses (Fig. 8, 9).

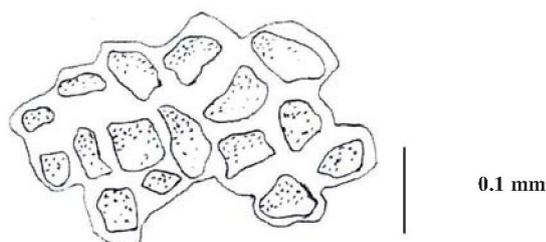


Figure 8. Cells of parenchymatic layer under epidermis

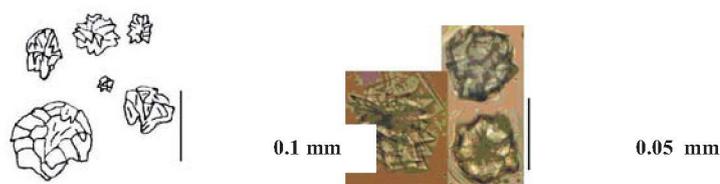


Figure 9.Druses crystals of calcium oxalate

b-2.b- The second parenchymatic layer is multilayered and consists of thin walled cells. These layers contain less carotene, more druses and a few simple crystals of calcium oxalate (Figs. 10, 11). Furthermore, the presences of stone-cell fragments were detected. These cells are very thick walled and flattened or with wide lumen and pored (Fig. 12).

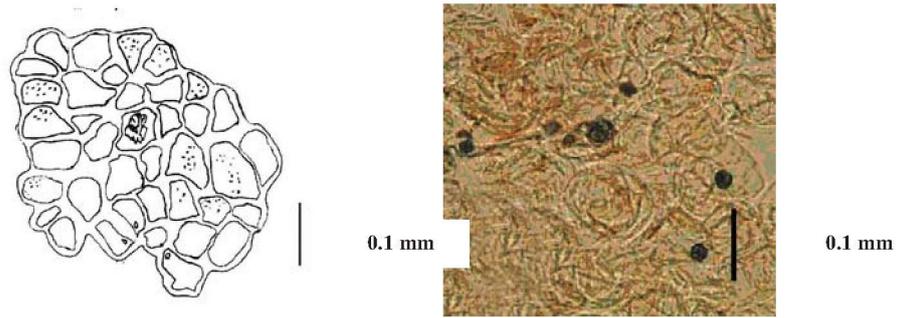


Figure 10. Cells of second layer in parenchymatic region

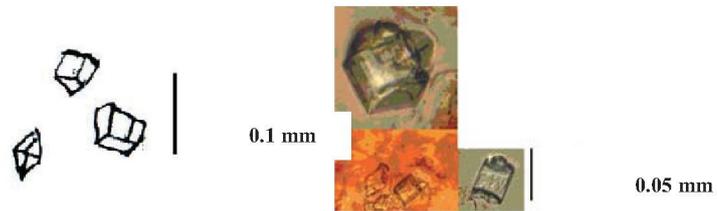


Figure 11: Simple crystals of calcium oxalate

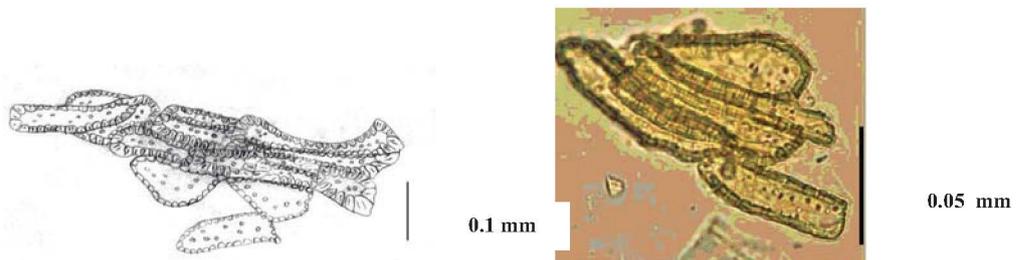


Figure 12. Stone cells

Fragments of vascular bundles and vessels also have been shown in rose hips powder. Some of the parenchyma cells that are near vascular bundles contain druses (Fig. 13).

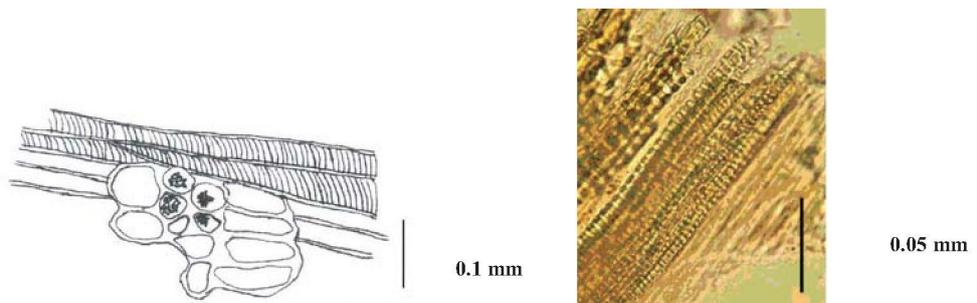


Figure 13. Vascular bundles and druses

b-3. Internal Epidermis of Hypanthia: Internal epidermis consists of small, thin walled cells. These cells contain small druses and occasionally prisms of calcium oxalate crystals (Fig. 14). Abundant of unicellular, long, thick lignified walled, prickly and needles like covering hairs have been shown in the internal epidermis (Fig. 15).

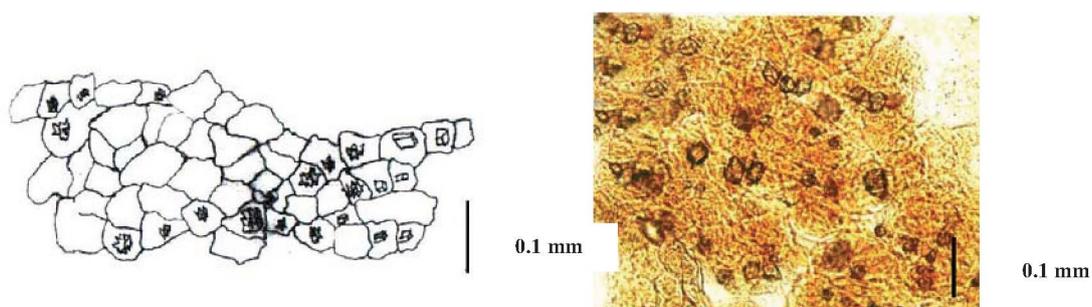


Figure 14. Internal epidermis cells

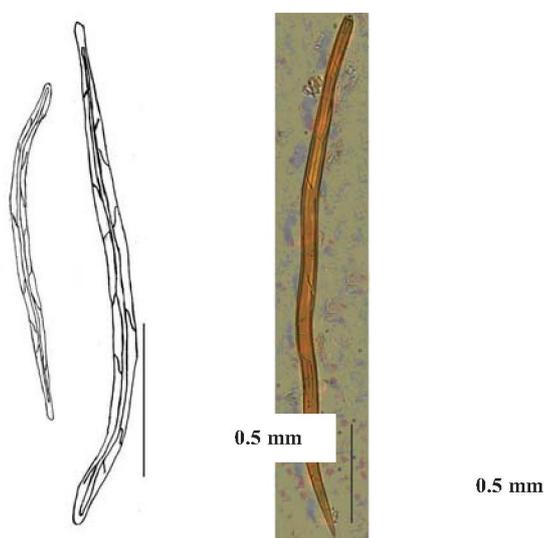


Figure 15. Unicellular covering hair

DISCUSSION

In this study, the morphological and anatomical structure of Rose hips (Dog rose, *Rosae pseudo-fructus*), which sold in some herbalists in Ankara, was reported and additionally fruits of two natural samples (reference drugs) of *Rosa canina* were investigated. Furthermore, we also have determined whether or not their features are suitable to the European Pharmacopoeia.

In Turkey, 24 species (30 taxon) of genus *Rosa* L. (Rosaceae) were found (1). According to Flora of Turkey, the length of the fruit of 19 of these species is less than 2 cm, whereas, the fruit length of *R. villosa*, *R. hirtissima*, *R. tomentosa*, *R. canina* and *R. dumalis* species is more than 2 cm. The outer surface of hypanthias of *R. villosa*, *R. hirtissima* and *R. tomentosa* is covered with glandular-hispid hairs. The hypanthia shape of *R. dumalis* is ovoid- pyriform, rarely globose and sepals are persistent (1, 14). When the morphological characters of the samples, purchased

from herbalists were compared with data in the literatures (1, 14) and standards 1 and 2. Results have been shown that the purchased samples are most probably belonging to *R. canina* fruits.

The samples purchased from the herbalists consist of whole fruits or fragments of hypanthia with achenes and hairs. These collected samples are not suitable to the definition of officinal drug of *Rosae pseudo-fructus* in European Pharmacopoeia 2008 since the drug should not contain achenes (3). However, some monographs such as PDR, German Commission E accept rose hips with achenes (6, 8).

In this study, the observed anatomical characteristics of the standards 1, 2 and purchased samples of rose hips were found to be suitable to the European Pharmacopoeia 2008 (3). Furthermore, multicellular and multi-rowed stalked and multicellular headed glandular hairs were detected at the first time (Figure 6). Presence of the multicellular covering hairs, which recorded only in 1961 S.S.C.B Pharmacopoeia, was also observed (14). This type of glandular hairs thought to be deciduous when the fruit ripened. According to Kesikoğlu, fruits of *R. canina* contain rows of druses inside the parenchyma cells of the internal epidermis. However, in fruits of *R. dumalis* druses are scattered in parenchyma cells (14). When the anatomical features of samples collected from herbalists compared with the previous data of literature and the reference drugs, the investigated rose hips samples thought to be fruits of *R. canina*.

Fragments of *Hibiscus* flowers determined in samples **1a** and **2b** have been used to give color to the samples when prepared as herbal tea. According to the table 2, the added amount of *Hibiscus* flowers to that two samples are similar.

In this study, the anatomical and morphological results of the samples that purchased from the herbalists in Ankara have shown that these samples might be hypanthia of *R. canina*. However, the morphological features of these samples are not suitable to the European Pharmacopoeia 2008. Moreover, some samples of rose hips (2a, 3, 4, 5) have been sold in open air, for this reason these samples might not be suitable to hygienic conditions.

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Received: 12.03.2008

Accepted: 14.01.2009