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MORPHOLOGICAL AND PALYNOLOGICAL STUDIES ON *ROSA PISIFORMIS* IN EASTERN TURKEY[1]

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SUMMARY

The genus *Rosa* is represented in Turkey by 24 species. Only two taxa are endemic: *R. pisiformis* (Christ) D. Sosn. and *R. dumalis* Bechst. subsp. *boissieri* (Crépin) Ö. Nilsson var. *antalyensis* (Manden.). *R. pisiformis* grows in North-East and East Anatolia. It has the smallest hypanthia of the *Rosa* species growing in Turkey. Their hypanthia are used as amulet and their stems as fuel in Van province. In this study the anatomical characteristics of leaves and pollen grains of *R. pisiformis* were examined.

ÖZET

Rosa cinsi Türkiye Florası' na göre ülkemizde 24 türle temsil edilmektedir. *R. pisiformis*(Christ) D. Sosn. ve *R. dumalis* Bechst. subsp. *boissieri* (Crépin) Ö. Nilsson var. *antalyensis* (Manden.) Ö. Nilsson. Türkiye için endemik taksonlardır. *R. pisiformis* Kuzey Doğu Anadolu ve Doğu Anadolu bölgesinde yayılış gösteren Türkiye'de yetişen diğer doğal türler arasında en küçük hipantiyumlara (meyvalara) sahip olan türdür. Van ili çevresinde hipantiyumların nazarlık olarak kullanımı yaygın ve dikkat çekicidir.

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Ayrıca gövdeleri de yakacak olarak kullanılmaktadır. Bu çalışmada , türün yaprak anatomik özellikleri ile polen özellikleri saptanmıştır.

Kew words: *Rosa pisiformis,* leaf anatomy, pollen grain, East Anatolia.

INTRODUCTION

The genus *Rosa* L. is represented by 24 species in Turkey, only two taxa are endemic: *R. pisiformis* (Christ) D. Sosn. and *R. dumalis* Bechst. subsp. *boissieri* (Crépin) Ö. Nilsson var. *antalyensis* (Manden.) Ö. Nilsson. *R. pisiformis* is distributed in NE and E Anatolia and it has the smallest hypantia of the *Rosa* species occuring in Turkey (1, 2). M. Koyuncu observed that *R. pisiformis* is used in Van province as amulet (against to evil eyes). It is well known in Turkey that using the fruits of wild plants as amulet, for example fruits of *Peganum harmala* (Zygophyllaceae) are very widely used for the same purpose.

Rosa pisiformis is very atractive species with dark pink flowers, unfortunately its population decreases because stems of this species are cut down by local people for fuel. Intensive grazing and utilization of shrubs and woody-stocked cushion-forming perennials (e.g. *Astragalus*, *Acantholimon* and *Onobrychis*) for fuel pose a serious threat to the vegetation and exacerbate erosion problems in East Anatolia.

Vernacular name of *R. pisiformis* is "nazarlık gülü" in Van province (3). It is observed that anatomical and palynological characteristics are important to identify the *Rosa* species (4, 5, 6, 7). Then the aim of this study was to work in detail on this endemic species present its distribution, threats, leaf anatomy and pollen grains characteristics.

MATERIAL AND METHOD

The *Rosa* materials for the present work based on the herbarium samples kept in ISTE. Cross sections were obtained from the central part of terminal leaflets of leaves by hand preserved material and stained by Sartur reactive. Also surfaces sections were taken from upper and lower parts of the leaf epidermis. Photographs were taken by Photomicroscope Olympus BH-2. Pollen grains of *R. pisiformis* (Christ) D. Sosn. were examined using by the standard methods of Woodhouse (8), and the terminology used as in accordance to Faegri & Iversen (9). Different references are used for anatomical study (10, 11, 12, 13, 14).

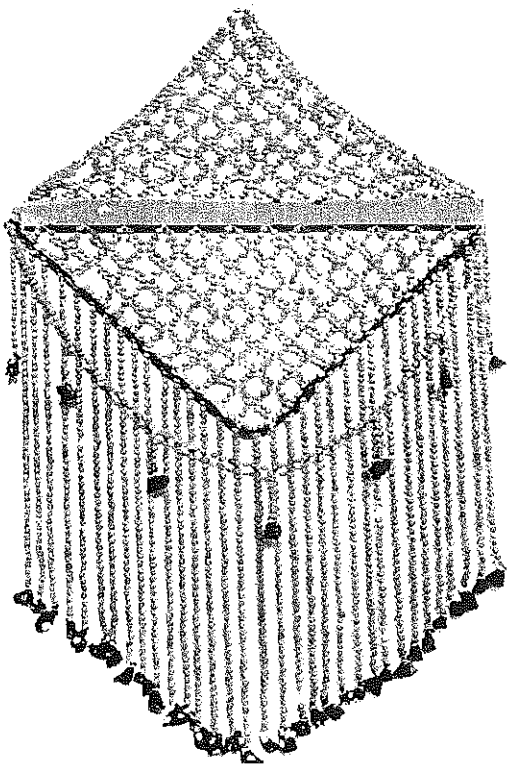

Photo. The fruits of *Rosa pisiformis* as amulet (photo. M. Koyuncu)

RESULT AND DISCUSSION

The *Rosa* species distributed in East Anatolia are given as below .

The genus *ROSA* in East Anatolia (Flora of Turkey and the East Aegean Islands)

R. phoenicia Boiss.

R. pisiformis (Christ) D. Sosn.

R. beggeriana Schrenk

R. foetida J. Herrm.

R. hemisphaerica J. Herrm.

R. pimpinellifolia L.

R. pulverulenta Bieb.

R. iberica Stev.

R. canina L.

R. dumalis Bechst. subsp. *boissieri* (Crépin) Ö. Nilsson var. *boissieri*

R. heckeliana Tratt. subps. *vanheurckiana* (Crépin) Ö. Nilsson.

Rosa pisiformis (Christ) D.Sosn. in Izv. Akad. Nauk Arm. SSR 8:69 (1942).

Syn.: *R. cinnamomea* L. var. *pisiformis* Christ in Boiss., Fl. Or. Suppl. 210 (1888).

Erect shurb up to 2 m. tall with a brownish, lustrous stems. Prickles sparse, often absent on young shoots, thin, ± straight, 4-7 mm, passing into small bristles, abruptly tapering. Leaves 3-9 cm long, leaflets 5 (7) oval to narrowly ovate 1.5-4.5 x 0.7-2 cm ± acute, base rounded, uniserrate, glabrous to pubescent above, densely pubescent, occasionally glandular and bluish-grey beneath, stipules broad, glandular-serrate, ciliate. Flowers usually in 3-10 flowered corymbs, bracts large. Pedicels 1-2 cm, glabrous. Sepals entire, very narrow, ± linear. Petals deep rose, retuse. Styles densely pubescent, stigma head compact, subglobose, disc narrow with a small orifice. Hypanthia 0.5-0.7 cm, ± spherical, glabrous, scarlet, sepal and disc deciduous.

Flowering time: July

Habitat and altitude: Moist meadows, boggy places, *Salix* scrub by rivers and streams.1600-2000 m.

Type: (Turkey) Armenia Turcia, Aucher 1431 (iso. K)-in Fl. Or. (2:676, 1872) Boissier referred this plant to *R. cinnamomea*.

Conservation status: Endangered.

Uses: Amulet and fuel.

Distribution: North-East and East Anatolia.

This species is most closely related to *R. beggeriana* Schrenk, it differs from it in having dark red flowers, sparse straight prickles, 5 (7) leaflets, broad and glandular-serrate or ciliate stipules, glabrous pedicels, very narrow sepals.

Anatomical characteristics of *R. pisiformis*

Examined specimen: B9 Van: Van between Hoşap, (Güzelsu), around of castle of Hoşap, 2000 m., 16.7.2000, N. & E. Özhatay, N. Demirkuş, ISTE 79654

Cross sections were taken from the leaves of the plant and investigated in detail. The results are given below:

Anatomy of the leaf

Leaves are bifacial and hypostomatic.

Epidermis: Single layer of cells are elongated in various sizes. There is a thick cuticular layer on it and the cells of the upper epidermis are bigger than those of lower epidermis. On the cross section, walls of the epidermis cells are undulate, that upper ones are slightly, lowers are prominent. On the lower surface midrib is obviously convex.

Hairs: It has two types (glandular and nonglandular) of hairs. Simple unicellular long hairs which thickened cuticular walls are present densely on the lower surface, rarely on the upper surface of the leaves; glandular hairs, which consist of multicellular stalk and heads are found rarely only on the lower surface.

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

Stomata: Leaves are hypostomatic. The stomata are present only on the lower surfaces of the leaves. They are oblong usually surrounded by 4-5 adjacent cells.

Mesophyll: The palisade parenchymatous cells are lined-up tightly and occupy a wide area in the mesophyll. The spongy parenchyma has two-three layers. There are no broad intercellular spaces in the mesophyll tissue. Vascular bundle are collateral type. The upper and lower parts of the central vessel are surrounded by parenchymatous cells. Also there is a few sclerenchymatous cells around of vascular bundles.

Pollen grains characteristics of *R. pisiformis*

Examined specimen: B9 Van: Van between Hoşap, (Güzelsu), around of castle of Hoşap, 2000 m., 16.7.2000, N. & E. Özhatay, N. Demirkuş, ISTE 79654

Pollen type: Tricolporate

Pollen shape: Spheroidal, P/E: 0.945 (W.)

Structure: Tectate

Sculpture: Striate

The measurements of *R. pisiformis* pollen grains according to Woodhouse's method (μ).

Fresh pollen (W)

P: 31.62

E: 33.43

clg: 26.42

clt: 6.75

plg: 10.21

plt: 9.03

t: 5.88

Abbreviations: P: polar length, E: equatorial diameter, W: Wodehouse method, clg: colpus length, clt: colpus diameter, plg: porus length, plt: porus diameter, t: apocolpium

DISCUSSION

The anatomical studies are based on transverse and surface sections of the leaves. It is found that anatomical characteristics of cuticle, presence of collenchyma, shape of sclerenchyma layer, characteristics of the walls of upper and lower epiderma cells, crystal and hair types, stoma shape and amount of adjacent cells are important data to differentiate the *Rosa* species anatomically. *R. pisiformis* is compared by the anatomical characteristics with the other *Rosa* taxa studied before (4, 7) and these characteristics are given below with the species belong the same principles:

1) General leaf shape in cross section are similar to: *R. sempervirens, R. phoenicia, R. gallica, R. agrestis*

2) The absence of collenchyma below the vascular bundle on the midrib: *R. sempervirens, R. phoenicia, R. foetida, R. gallica, R. micrantha, R. sicula*

3) The presence of few sclerenchymatous cells: *R. phoenicia, R. agrestis, R. pulverulenta, R. sicula, R. horrida*

4) Undulating the lower epidermis cells: *R. sempervirens, R. foetida, R. gallica, R. micrantha, R. pulverulenta, R. horrida, R. iberica, R. canina*

5) Density of the stomata: *R. phoenicia, R. gallica, R. sicula*

6) Both including glandular and nonglandular hairs: *R. foetida, R. agrestis, R. pulverulenta, R. iberica*

Generally walls of the upper epidermal cells are thicker than the cells of lower epidermis in the *Rosa* species. The cells of the upper epidermis are bigger than those of the lower surface. Also the stoma shapes are oblong and generally by 4-5 adjacent cells. According to the anatomical characteristics *R. pisiformis* is related to *R. pulverulenta* and *R. iberica*.

According to other studies (4, 6, 7) it has been observed polimorphism phenomenon in pollens of three different *Rosa* species such as *R. gallica, R. micrantha, R. iberica*. There has not been seen any polymorphism phenomenon in *R. pisiformis*.

The shape and size of them are usually spheroidal: *R. sempervirens, R. foetida, R. pisiformis, R. agrestis, R. sicula* etc. rarely suboblate: *R. phoenicia*. Exine structures of all species are tectate. Sculptures are generally granulate-striate (*R. micrantha, R. agrestis, R. pulverulenta, R. sicula, R. horrida, R. iberica*) rarely striate (*R. sempervirens, R. pisiformis, R. foetida, R. gallica, R. canina*) or granulate (*R. phoenicia*). The pollen characteristics of *R. pisiformis* is similar with *R. sempervirens, R. foetida* and *R. canina*. This reasults indicate that pollen characteristics can help for taxonomical identification.

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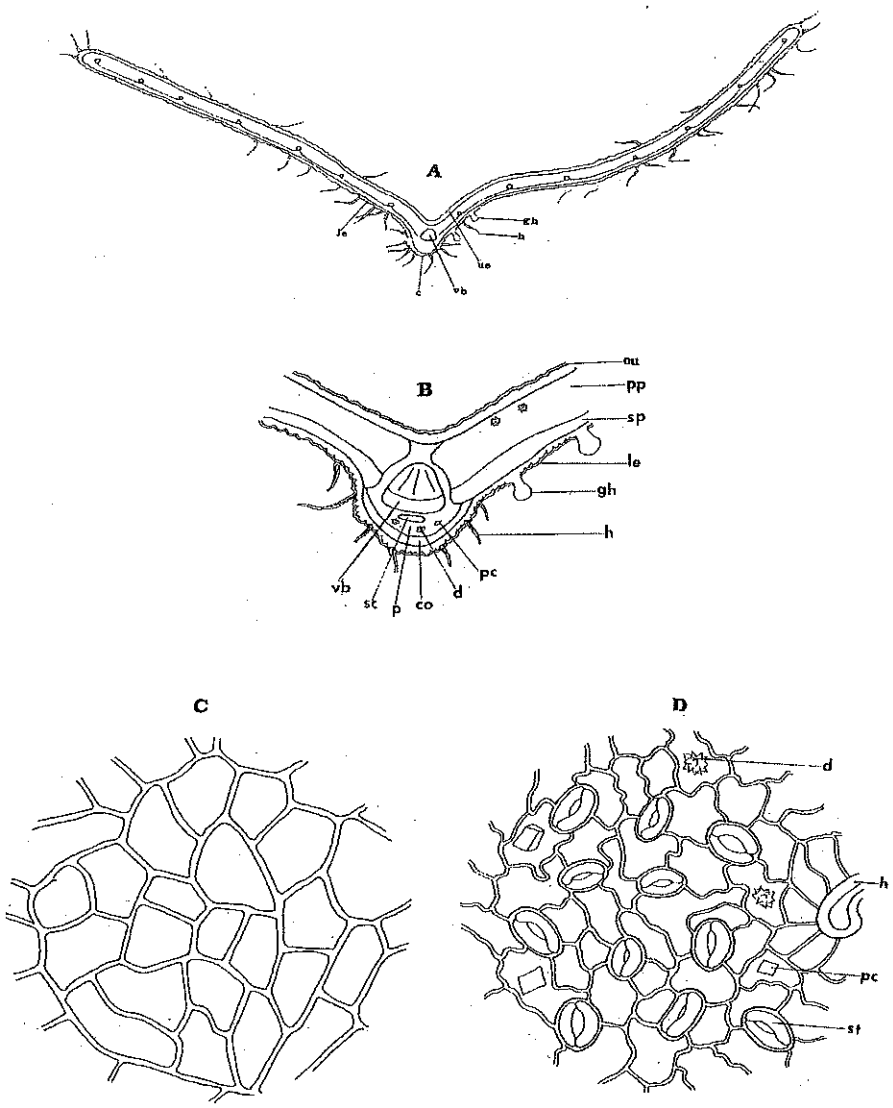

Figure 1. *R. pisiformis*(ISTE 79654) A, cross section of the leaflet (x20); B, midrib (x112.5); C, surface view of the upper epidermis (x450); D, surface view of the lower epidermis (x450); cu, cuticle; ue, upper epidermis; le, lower epidermis; h, hair; vb, vascular bundle; gh, glandular hair; pp, palisade parenchyma; sp, spongy parenchyma; d, druse; pc, prismatic crystal, p, parenchyma; sc, sclerenchyma, co, collenchyma; st, stoma.