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A Morphological Study on *Phryna Ortegioides* (Fisch. & C. A. Mey.) Pax & K. Hoffm. from Bingöl (Turkey)

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Abstract

In this study morphological characters of *Phryna ortegioides* (Fisch. & C. A. Mey.) Pax & K. Hoffm. was examined for the systematic purposes which has distributed in the Bingöl province. In this context morphology of studied sample was examined by scanning electron microscope (SEM) and stereo microscope. As a result with this study new morphological properties for diagnostic purposes have determined and the description of *P. ortegioides* have extended.

Keywords: Phryna, Morphology, Systematic.

Bingöl'de (Türkiye) ki *Phryna Ortegioides* (Fisch. & C. A. Mey.) Pax & K.Hoffm Üzerine Morfolojik bir Çalışma

Özet

Bu çalışmada Bingöl'de yayılış gösteren *Phryna ortegioides* türünün morfolojik özellikleri sistematik açıdan araştırıldı. Bu kapsamda çalışılan türün morfolojisi taramalı elektron mikroskobu (SEM) ve stereo mikroskop ile incelendi. Sonuçta bu çalışma ile türün teşhisi için yeni morfolojik özellikler tespit edilerek, türün betimi genişletildi.

Anahtar Kelimeler: Phryna, Morfoloji, Sistematik.

Introduction

The Caryophyllaceae is a large, cosmopolite family of 86 genera and about 2200 taxa of herbs and small shrubs of which, contains 32 the genera and about 470 species in the world [1, 2]. This family is primarily Holarctic in distribution, manifesting its species diversity

mainly in the Mediterranean and Irano-Turanian regions. Caryophyllaceae was divided into 3 subfamilies; Alsinoideae, Caryophylloideae and Paronychioideae [1]. Caryophyllaceae represented in Turkey by 32 genus, about 516 taxa, 193 of them are endemic (ca. 40%) [3-6]. Determination of relationships within the *Caryophyllaceae* has been difficult, owing to the fact that many genera are not well defined morphologically and are difficult to distinguish [1] and that it is difficult to find phylogenetically useful morphological characters due to convergence of characters used in taxonomic classifications [7].

The genus *Phryna* Pax & Hoff. (Caryophyllaceae) is represented in Turkey by only *P. ortegioides*, so this species is monotypic and endemic for Turkey. Synonyms of *Phryna ortegioides* are; *Tunica ortegioides* Fisch & Mey.; *Saponaria ortegioides* (Fisch & Mey.) Boiss. and Bal. And *Gypsophila ortegioides* (Fisch & Mey.) Boiss. The genus *Phryna*, perennial herb with woody caudex and several glandular-puberulent, dichotomously forked stems, linear leaves, 5-costate long campanular calyx provided with 2-3 pairs of bracteoles at the base, petals linear-cuneate, white with pink veins. The genus is closely related to *Gypsophila* L., from which it differs by the involucrate calyx [8]. There are some morphological studies with some Caryophyllaceae genera: [9-17].

This species is an endemic taxon for Turkey and morphological structure of *Phryna ortegioides* has not been studied in detail before. Extensive descriptions of the morphological characteristics of this species have been given in this study.

Materials and Methods

P. ortegioides (ÖK-4817) was collected by Ömer Kılıç from Aşağıköy village road side (altitude of 1400-1450 m), Bingöl / Turkey, in September 2012. The voucher specimens kept in the Bingol University Herbarium with 1270 herbarium number. The identification of plant sample was made according to volume 2 of Flora of Turkey [8] and all measurements were made directly on herbarium specimens. Morphological studies of sample was determined and compared figure of leaf shape, leaf indumentum, gynoecium, androecium, corolla and calyx by stereo microscope. In addition, the pollen character, stem indumentum, leaf indumentum and seed coat surface of the plant sample was examined with a Hitachi SU-1500 scanning electron microscope (SEM), coated with gold in Wilfrid Laurier University (Canada) Herbarium (Biology).

Result and Discussion

Morphological properties:

Systematic specifications of *Phryna ortegioides* (Fisch. & Mey.) Pax & K. Hoffm.:

Pruinose-puberulent perennial, 10-25 cm high, with woody caudex and several glandular-puberulent, dichotomously forked stems. Leaves lineare, up to 10x1 mm, acute. Flowers sessile, axillary and terminal, mostly solitary, forming lax terminal racemes. Calyx narrowly campanulate, 3-4 mm, 5-costate with hyaline intervals, glandular puberulent, incised to 1/3, with lanceolate acuminate teeth. Petals linear-cuneate, 5-6 mm, white with pink veins. Capsule long-ovoid, longer than calyx, opening to middle with 4 valves, 1 or 2 seeded. Seeds oblong, comma shaped, with straight prominent radicle. Styles 2. Monotypic and endemic. Fl. 7-9. Stony slopes, 1000-2100 m. The genus is closely related to *Gypsophila*, from which it differs by the involucrate calyx. General view of *P. ortegioides* is seen in Figure 1.

Figure 1. General view of *P. ortegioides*.

Stem:

The stem of *P. ortegioides* is well developed, branched, 15-35 cm, with woody caudex and several glandular-puberulent, dichotomously forked stems.

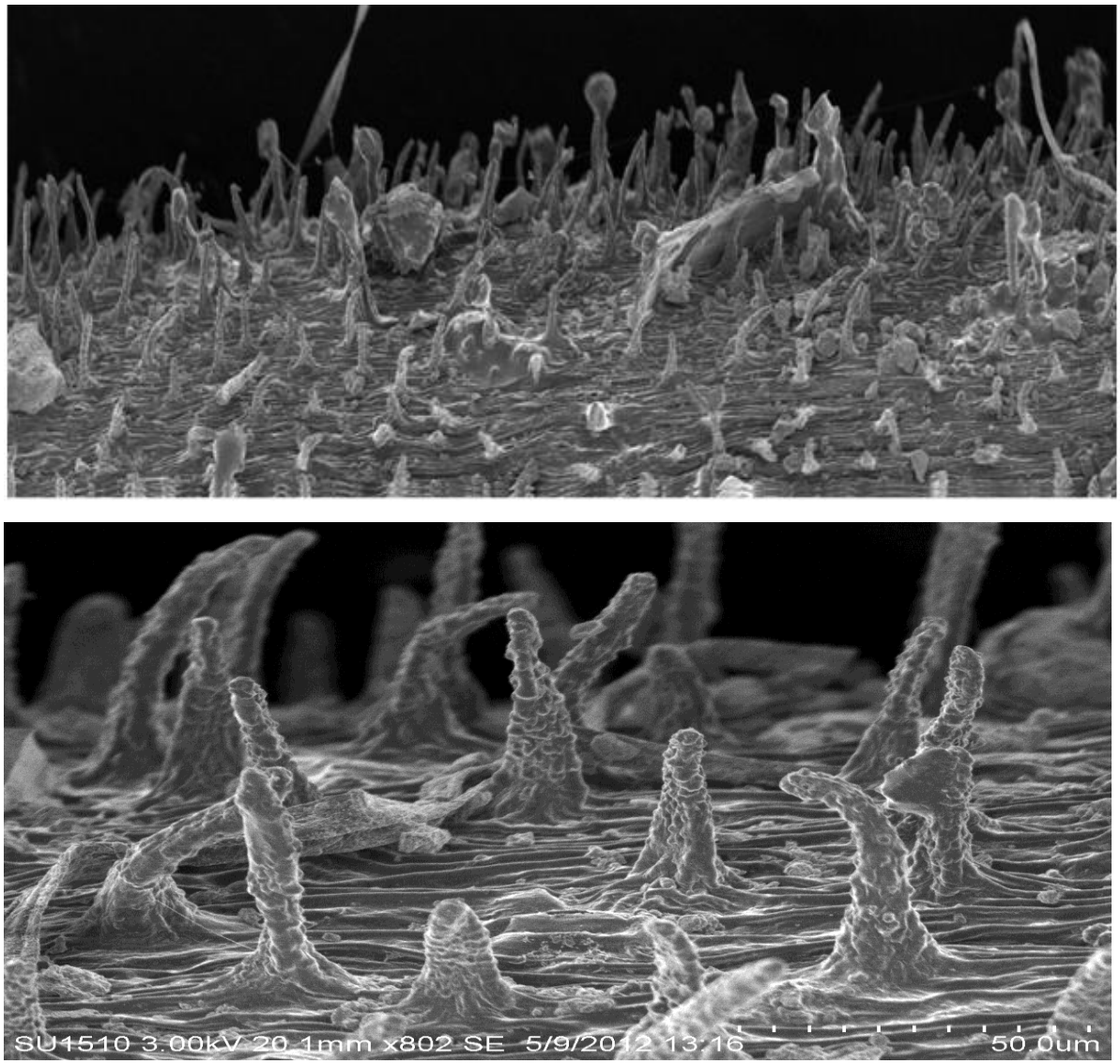
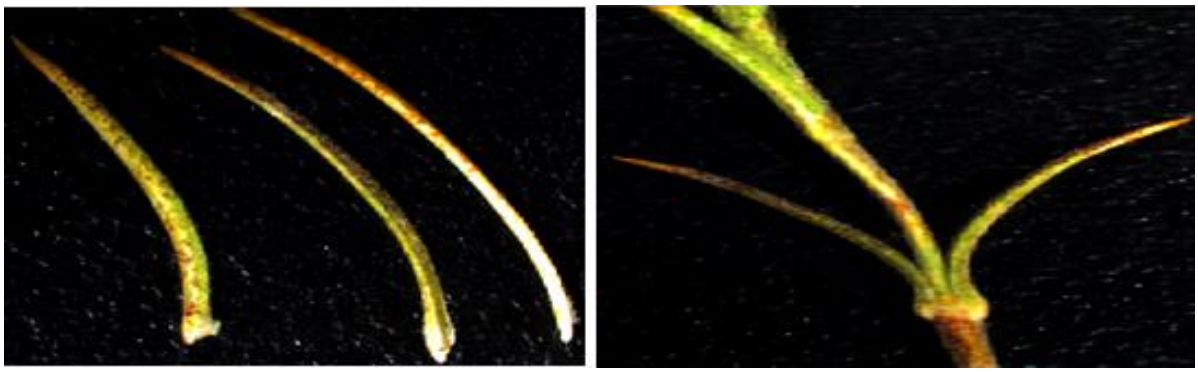


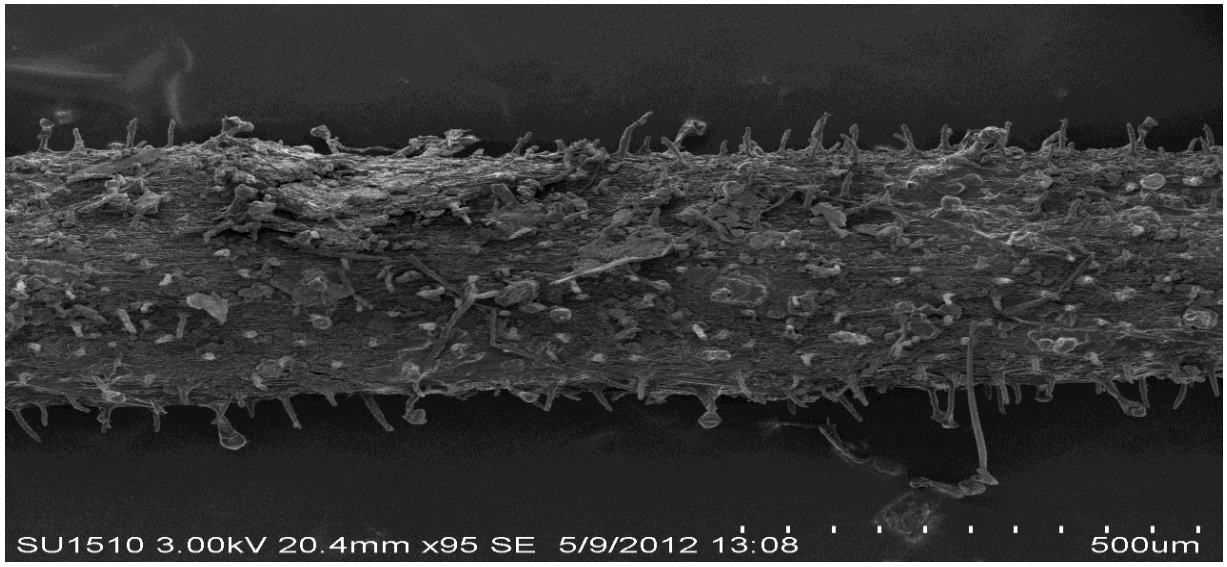
Figure 2. Stem of *P. ortegioides* (SEM photomicrographs).

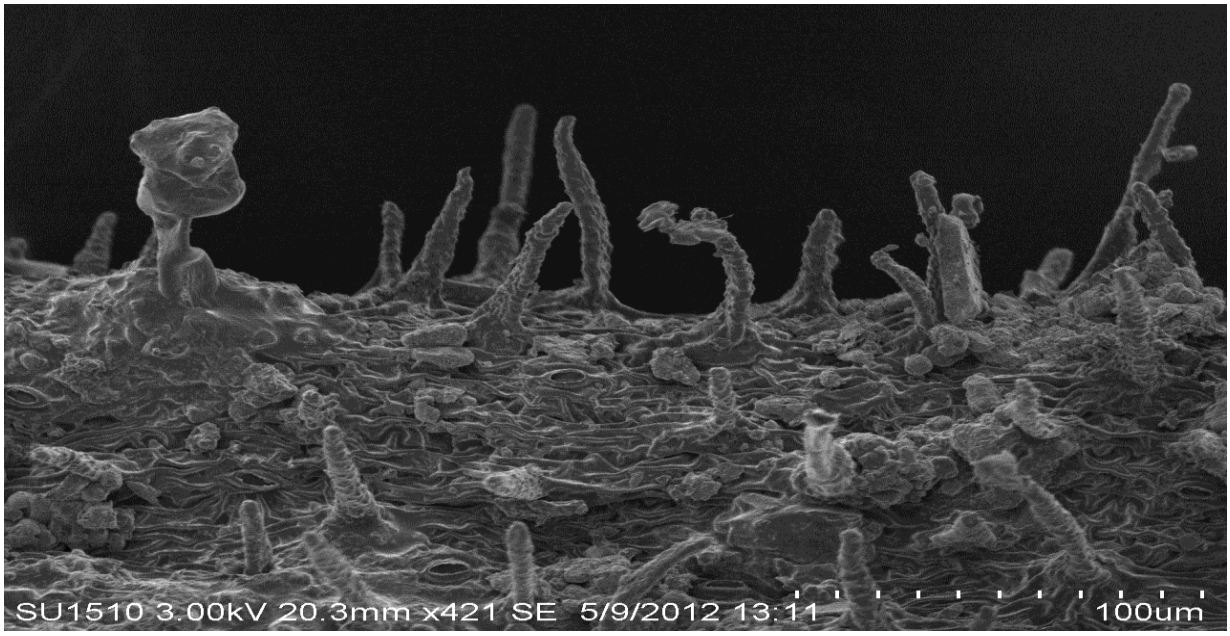
Leaves:

Leaves of *P. ortegioides* lineare and sessile, up to 15 x 1 mm, with shortly pilose hairs and scarcely glands and nodes are swollen.



(a)





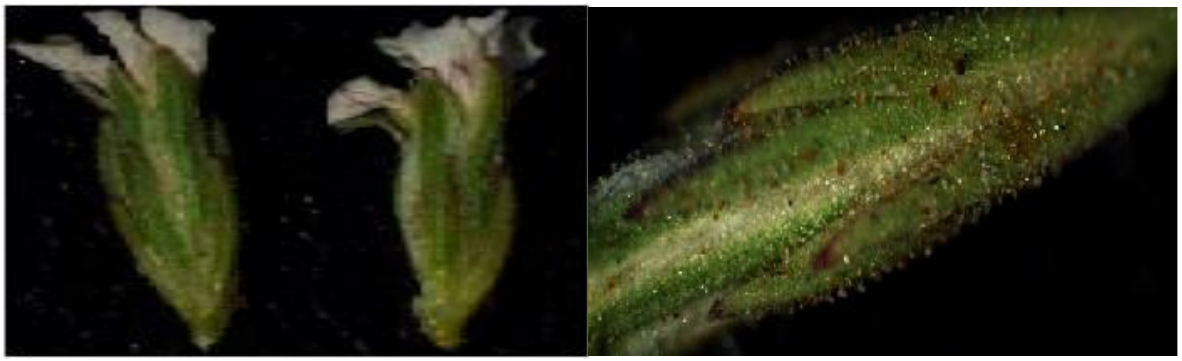
(b)

Figure 3. Leaves and leaf indumentum of *P. ortegioides* (**a**: stereo microscop, **b**: SEM).

Inflorescence:

Flowers are sessile, axillary and terminal, mostly solitary, forming lax terminal racemes. Calyx narrowly campanulate, 4-5 mm, glandular-puberulent with lanceolate acuminate teeth. Corolla with 4 petals, petals 3-4 mm, linear-cuneate, white, greyish in the base and without pink veins. Androecium has 4 stamen and theca surface is smooth.

Figure 4. Inflorescence of *P. ortegioides.*



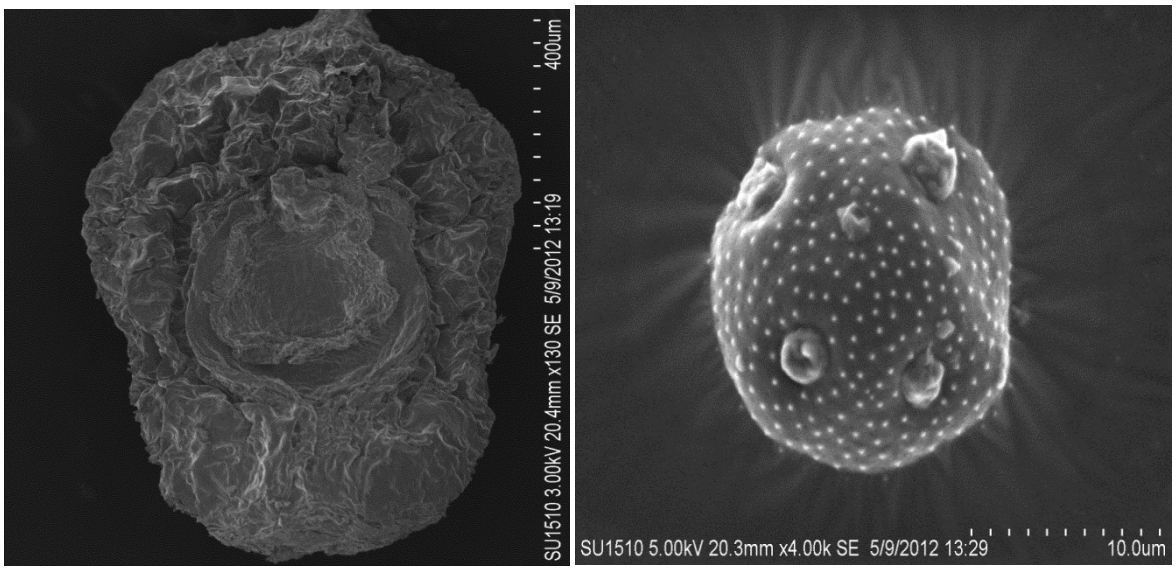
Calyx Calyx surface

Corolla Gynoecium Androecium

Figure 5. Plant parts of *P. ortegioides* (stereo microscop).

Seed and Pollen:

Nutlet of *P. ortegioides* is comma shaped, smooth, c.0,5 x1 mm., colour is bright-black. Pollen shape and ornemantation of *P. ortegioides* was oblate-spheroidal and scabrate-microperforate.



a **b**

Figure 6. *P. ortegioides*, **a**) seed, **b**) pollen (SEM).

P. ortegioides was investigated morphologically in order to assist in identification of this sample. The results obtained from morphological studies of *P. ortegioides* were generally consistent with the description given in Flora of Turkey. But some properties of our sample was different from Flora of Turkey. Additionally with this study new morphological properties have determined which have not seen in the Flora of Turkey (Table 1). Leaf indumentum of *P. ortegioides* unspecified in Flora of Turkey and literature, whereas indumentum of our sample shortly pilose hairs and scarcely glands. Despite corolla, stamen and theca surface and pollen properties of *P. ortegioides* unspecified in Flora of Turkey and literature, in this study these characters have detected. More detailes about morphological character of studied sample are shown in Table 1.

In general, with a few exceptions, the results of the present study show that micromorphology of *P. ortegioides* seems to provide valuable and distinctive characters for diagnosic purposes.

Table 1. Morphological characters of *P. ortegioides* from Flora of Turkey and studied sample.

CHARACTERS	FLORA OF TURKEY	STUDIED SAMPLE
Leaves lenght (cm) and shape	Up to 10x1 mm, lineare.	Up to 15 x 1 mm, lineare and sessile.
Leaf indumentum	-	Shortly pilose hairs and scarcely glands.
Stem	10-25 cm high, with woody caudex and several glandular-puberulent, dichotomously forked stem.	15-35 cm high, with woody caudex and scarcely glandular, mostly puberulent hairs and dichotomously forked stem.
Calyx indumentum	Glandular-puberulent.	Glandular-puberulent.
Calyx lenght (mm) and shape.	3-4 mm, narrowly campanulate	4-5 mm, narrowly campanulate.
Petal lenght (mm), shape and colour	5-6 mm, linear-cuneate, white with pink veins.	3-4 mm, linear-cuneate, white-greyish in the base and without pink veins.
Seed properties	Oblong, comma shaped.	Oblong, comma shaped, bright-black, surface smooth and roughly.
Corolla	-	Corolla with 4 petals
Stamen and theca surface	-	4 stamen and theca surface smooth.
Pollen, Polar axes	-	25.60 ± 1.20 (um)
Pollen, Equatorial axes	-	27.21 ± 1.29 (um)
Pollen shape and ornamentation	-	Oblate-spheroidal and scabrate-microperforate.

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