

**RARE AND ENDEMIC *PIMPINELLA* SPECIES FROM TURKEY:  
*P. SINTENISII* H. WOLFF**

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**SUMMARY**

*Pimpinella sintenisii* H. Wolff was collected by Sintenis in 1888 from Mardin, Southern Turkey named as *Reutera intermedia* Stapf. In 1937 Wolff. changed the genus as *Pimpinella* and named *P. sintenisii*. Its distribution recorded in Flora of Turkey Mardin, Siirt and Northern Iraq. The specimens from Northern Iraq were (1961) described as a new species *P. nephrophylla* Rech. F. H. Riedl and it is also recorded in Turkey by Ertekin. *P. sintenisii* and related 3 species are yellow flower and distributed in Southern Turkey. A comprehensive study has been carried out in *P. sintenisii*, *Pimpinella nephrophylla*, *Pimpinella paucidentata* V.A.Matthews and *Pimpinella flabellifolia* (Boiss.) Benth. ex Drude.

**ÖZET**

*Pimpinella sintenisii* H. Wolff 1888 yılında Sintenis tarafından Türkiye'nin güneyinden Mardin'den toplanmış ve *Reutera intermedia* Stapf. olarak isimlendirilmiştir. 1937'de Wolff tarafından *Pimpinella* cinsine aktarılmış ve *P. sintenisii* adı verilmiştir. Yayılışı Türkiye Florasında Mardin, Siirt ve Kuzey Irak olarak kayıtlıdır. Kuzey Irak örnekleri (1961) *P. nephrophylla* Rech. F. H. Riedl ismiyle yeni bir tür olarak adlandırılmış ve Ertekin tarafından Türkiye'de de varlığı saptanmıştır. *P. sintenisii* ve diğer 3 tür sarı çiçeklidir ve Türkiye'nin güneyinde yetişmektedir. *P. sintenisii*, *Pimpinella nephrophylla*, *Pimpinella paucidentata* V.A.Matthews ve *Pimpinella flabellifolia* (Boiss.) Benth. ex Drude ile kapsamlı bir çalışma yapılmıştır.

**Key Words:** *Pimpinella sintenisii*, Umbelliferae/Apiaceae, rare and endemic, taxonomy, caryology

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## INTRODUCTION

*Pimpinella* is one of the largest genera (150 sp.) of the family Umbelliferae/Apiaceae. This genus is mainly distributed through subtropical and temperate regions of the northern hemisphere, and the Mediterranean region is one of the most important centres of diversity for this group (5).

According to recent taxonomic studies on the genus *Pimpinella*, about 28 taxa are recognised (7 endemic), 25 species, 5 subspecies, and 4 varieties (1, 2, 4). They are annual, biennial and perennial species, usually growing on dry rocky places rocky crevices, fields, meadows, mountain pastures and grasslands.

*Pimpinella sintenisii* H. Wolff represents a rather critical and still not deeply investigated species within the genus *Pimpinella*. The species belongs to the having yellow petals of the genus. *Pimpinella sintenisii* was firstly collected by Sintenis in 1888 described as *Reutera intermedia* Stapf, and then the species is changed to the genus *Pimpinella* by Wolff. This species is a typical orophyte, occurs on rocks crevices and has very narrow distribution (Mardin and Siirt provinces in Turkey) (Map 1, Fig. 1).

Although *P. sintenisii* is specified that is also occur in Northern Iraq in the Flora of Turkey. The specimen of N Iraq was named *P. sintenisii* H. Wolff var. *cinerea* Blakelock then it is published by Rech. F. H. Riedl as a new species *P. nephrophylla* in 1961. As a result, *P. sintenisii* was considered as an endemic species from Southeastern region of Turkey.

On the basis of field and herbarium investigations, as well as literature, *P. sintenisii* can be considered complex, including allied species such as *Pimpinella nephrophylla* Rech.f. & Riedl, *Pimpinella paucidentata* V.A. Matthews and *Pimpinella flabellifolia* (Boiss.) Benth. ex Drude (Fig. 3,4). The main purpose of this study, morphological, anatomical and caryological observations on *P. sintenisii* are carried out from taxonomical points of view and make the comparison with closely related species.



★ *P. sintenisii* ▲ *P. paucidentata* ■ *P. nephrophylla* ● *P. flabellifolia*

**Map 1.** The map of four related species.

## MATERIAL AND METHODS

The study is based on field, literature and herbarium surveys. *P. sintenisii* from Mardin (ISTE 98789) *P. nephrophylla* from Ergani/Diyarbakır (ISTE 95784) and *P. flabellifolia* from Sivas (ISTE 96850) were collected. The species of *P. paucidentata* couldn't be collected. Its morphological data have been taken from literature. Minimum 5 individual specimens were used in morphological measurement of each species. Only *P. sintenisii* specimens' fruits could be germinated. Therefore karyological study was conducted only for this species.

Transverse sections of fruits were taken by Lieca Cryostat, then stained with Sartur (mix solution: sudan III, aniline, chloral hydrate, lactic acid, iodine).

Mature seeds were potted for the karyological studies. Root tips were pretreated with 0.05% 1-bromonaphthalene solution at 4 °C for 24 h and then fixed in fresh Carnoy's solution overnight. Root tips were hydrolysed for 10–12 min in 1 N HCl at 60 °C, washed and stained in Feulgen solution for 1–2 h. Stained meristems were squashed in a drop of 2% aceto-orcein and permanent preparations were made by the liquid CO<sub>2</sub> method. Preparations were studied using an Olympus BX53 light microscope equipped digital camera. Also measurements of somatic chromosomes were made

by program of KAMERAM©, they were calculated with formula of the relative variation in chromosome length ( $CV_{CL}$ ), mean centromeric asymmetry ( $M_{CA}$ ) in Zuo & Yuan (2011) and Peruzzi & Eroğlu (2013). Photographs of the living material were taken from Leica DFC 295 stereo microscope with a digital camera.

## RESULTS

The endemic and rare Turkish species *P. sintensisii* is redescribed as follows:

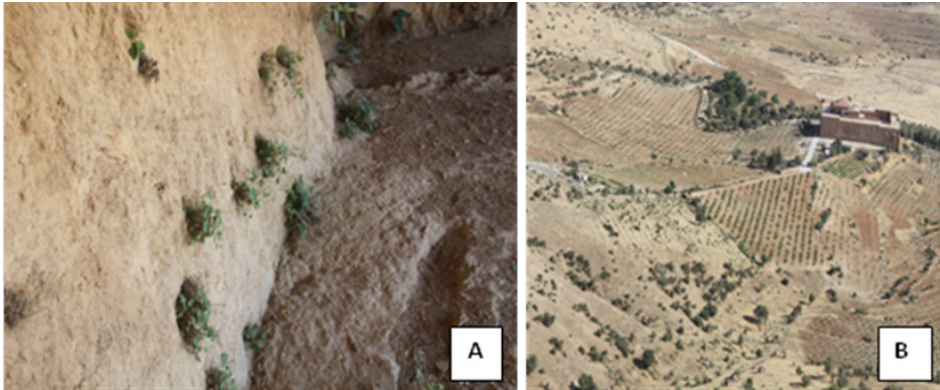
***Pimpinella sintensisii* H.Wolff, *Pflanzenr. (Engler) 90 (IV.228): 223 (1927)* (Fig. 2)**

Plant perennial, up to 30 cm high, glabrous. Stems erect, basal parts form rhizomes covered by numerous scale-like remains of petioles. Rosette leaves numerous, basal leaves 5–15 cm long, long petiolate (up to 9 cm), suborbicular, reniform, glabrous, 10-35 x 15-30 mm deeply dentate with long spines (1-2 mm). Middle cauline leaves reduced ovate leaves with wider and less teeth. Uppers reduced vaginate with small sessile reduced lamina, usually reduced to a sheath. Umbels with 3-5 equal rays, glabrous. Bracts and bracteoles absent. Umbellula with 5-10 flowers, sometimes; petals to 1 mm long, glabrous, yellow or greenish yellow, broadly ovate, 0,8-1 x 0,5-0,6 mm, inflexed. Fruit oblong-cylindrical, glabrous 2 -2,5 mm x 0,4-0,6 mm; stylopodium cushion-shaped, hemispherical, styloidium 1–2.5 mm long.

Fl: 5-6; Fr: 6-7

Chromosome number:  $2n = 20$ . Life form: orophyte.

Collected specimens: C8 Mardin, Above of Deyrulzafaran monastery, Old church (Notredam), 1212 m, 11.06.2012, E. Akalın, U.Uruşak (ISTE 98789)



**Figure 1.** A Habitat of *P. sintensisii*; B View of the Darulzafaran Monastery

In flora of Turkey, 5 yellow flowered species occur.

**Determination key of the petals yellow *Pimpinella* species.**

- 1- Basal leaves 2-pinnate, fruits subglobose . . . . . *P. aurea*
- Basal leaves simple, fruits oblong-cylindrical or ovoid. . . . . 2
- 2- Stems and leaves pruinose-puberulent or tomentosa, petals hairy . . . 3
- Stems, leaves and petals glabrous . . . . . 4
- 3- Leaves suborbicular or ovoid, cuneat at base, 8-20 serrate or dentate long teeth, teeth without on basal parts. . . . . *P. flabellifolia*
- Leaves orbicular or reniform, cordate at base, 30-50 dentate short teeth, teeth on whole margins. . . . . *P. nephrophylla*
- 4- Basal leaves 2-3 cm wide with 20-30 cuspidate teeth . . . . . *P. sintensisii*
- Basal leaves 0,5-2 cm wide with 4-15 teeth. . . . . *P. paucidentata*



**Figure 2.** *Pimpinella sintensisii* habit and flowers.

**Table 1.** Diagnostic Characters of related species of *P. sintenisii*.

	<i>P. sintenisii</i>	<i>P. paucidentata</i>	<i>P. nephrophylla</i>	<i>P. flabellifolia</i>
<b>Stem</b>	5-30 cm, glabrous	5-25 cm, glabrous	12-20 cm hairy	25-50 cm, hairy
<b>Basal leaves</b>	Suborbicular, glabrous, 10-35 x 15-30 mm	Suborbicular, glabrous, 5-25 x 5-20 mm	Orbicular-reniform, puberulent, 5-35 x 10-35 mm	Suborbicular, puberulent, 10-40 x 15-35 mm
<b>Leaf bases</b>	Cordate/truncate	Cordate	Deeply cordate	Cuneate
<b>Leaf margins</b>	15-30 cuspidate dentate teethly	5-15 dentate teethly	30-50 dentate teethly	8-20 serrate teethly
<b>Umbels</b>	5-10 flowered	5-8 flowered	8-12 flowered	4-9 flowered
<b>Petals</b>	Glabrous	Glabrous	Hairy	Hairy
<b>Fruits</b>	oblong-cylindrical, glabrous 2 -2,5 mm x 0,4-0,6 mm	oblong-cylindrical, glabrous 2 x 0,5 mm	Oblong, sparsely hairy 2 x 1 mm	ovoid, sparsely hairy 2-4 x 1-2 mm

Basically, *P. sintenisii* and *P. paucidentata* species are separated from other species whether it is hairy hairy on stems and leaves. Leaf margin of *P. sintenisii* is more dentate teetly from *P. paucidentata*.

All diagnostic characters of four related species are given in the Table 1.

*P. sintenisii* is an endemic species and it is known only two locations, it is considered as ‘Endangered’ (criterion B1 a).

It could also be categorized as ‘Critically Endangered’ (criterion B2) for its known ‘area of occupancy’ of less than 2 km<sup>2</sup>, population size estimated to be fewer than 250 mature individuals (criterion C).

We conclude that *P. sintenisii* must be classified as ‘Critically Endangered (CR)’ on the basis of its ‘reduction of population size’ and ‘area of occupancy’, although it is known from three locations (3).

Therefore, it is suggested that this new species should be placed under World Conservation Union (IUCN) threat category ‘Critically Endangered’ (CR) (3).



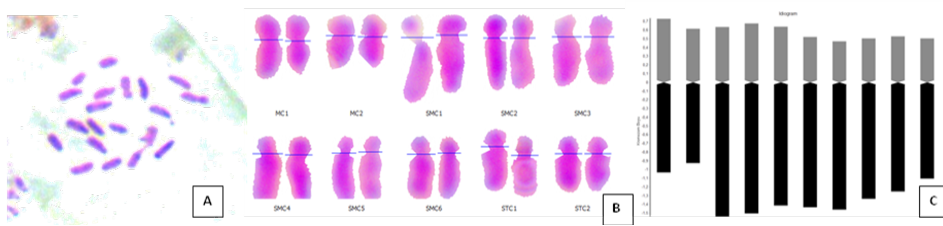
**Figure 3.** A *Pimpinella nephrophylla* B *Pimpinella flabellifolia*.



**Figure 4.** The fruits and cross sections of fruits.

#### **Karyology of *P. sintensis*:**

This species is diploid, with  $x=10$  as the basic chromosome number. Two chromosome pairs are shorter than the other pairs of the karyotype. Only one pair of satellite chromosomes was observed (SMC1). Chromosome lengths range between 1,54 - 2,46  $\mu\text{m}$  and the karyotype shows two metacentric, six submetacentric, and two subtelocentric pair (Fig. 5)



**Figure 5.** The chromosomes of *Pimpinella sintenisii*; A Mitotic metaphase plates, B Karyogram C Idiogram of *Pimpinella sintenisii*.

## REFERENCES

1. Ertekin A.S. & Kaya Ö.F., A new record species for the flora of Turkey, *Pimpinella nephrophylla* Rech. F. & H. Riedl. (Apiaceae). *Ot sistematik Botanik Dergisi*, 12(2), 13-18 (2005).
2. Güner A., Aslan S., Ekim T., Vural M., Babaç, M.T. (eds.), Türkiye Bitkileri Listesi (Damarlı Bitkiler), Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul (2012).
3. IUCN Species Survival Commission, *IUCN Red list categories*, Version 3.1. IUCN, Gland, Switzerland and Cambridge (2001).
4. Matthews V A *Pimpinella* L. — In: Davis, P. H. (ed.), *Flora of Turkey and the East Aegean Islands*, Vol. 4, p. 352-364. University Press, Edinburgh (1972).
5. Pimenov M.G. & Leonov M.V., *The genera of the Umbelliferae*. Royal Botanic Gardens, Kew, London (1993).