

About the presence of *Pulmonaria angustifolia* L. (Boraginaceae) in Turkey

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ABSTRACT

Background and Aims: Approximately 12,000 plant species grow naturally in Turkey. About 3500 of them are endemic. This number is increasing day by day with new floristic studies. The aim of this study; to confirm the existence of the *Pulmonaria angustifolia* L. species, whose record is suspicious.

Methods: This study is based on a herbarium sample collected by Bülent Olcay during the field study conducted in Western Anatolia (Bursa) in April 2019. As a result of the various relevant floras and literature studies, the specimen was identified as *P. angustifolia*. The *P. angustifolia* sample was confirmed by comparison with various herbarium samples. In this study, a description of the *Pulmonaria angustifolia* species was given. The species was examined in detail morphologically and compared with other herbarium samples.

Results: The presence of the *P. angustifolia* species, which has been mentioned as a doubtful record in the flora of Turkey, has been proven for the first time in Turkey. A new record has been added that the *Pulmonaria* species grow in Turkey. An identification key has been established for the *Pulmonaria* species found in Turkey, including the new record.

Conclusion: With this study, presence of *P. angustifolia*, which is mentioned as doubtful record is confirmed.

Keywords: *Pulmonaria*, Boraginaceae, new record, Turkey

INTRODUCTION

Boraginaceae is one of the largest Angiosperm families, and includes approximately 151 genera in the world. The genus *Pulmonaria* L. belongs to the Boraginaceae family, and is composed of about 18 species according to The International Plant Names Index (<http://powo.science.kew.org>). It's native range is Europe and Asia-Temperate. The *Pulmonaria* genus is represented by 4 species in Turkey. According to Edmonson (1978), 2 of them are mentioned as doubtful records; *Pulmonaria angustifolia* L. and *Pulmonaria officinalis* L. *Pulmonaria officinalis* is cultivated in the European part of Turkey (Yıldırım, 2000). In the Royal Botanic Gardens, Kew, Herbarium the presence of a plant specimen labelled *Pulmonaria azurea* Besser, collected from "Mt. Olympus" in 1844, is mentioned (Edmonson, 1978). *Pulmonaria azurea* is the synonym of *Pulmonaria angustifolia* (Körüklü, 2012; Merxmüller and Sauer, 1972, Sauer, 1987). It is uncertain whether the location information refers to "Uludağ", and W.Sauer was unable to find any *Pulmonaria* species on Uludağ in 1977 (Edmonson, 1978). The presence of *Pangustifolia* in Turkey requires confirmation. In this paper, a new record for the Flora of Turkey is reported.

MATERIALS AND METHODS

This study is based on a herbarium sample collected by Bülent Olcay during the field study conducted in Western Anatolia (Bursa) in April 2019. We tried to identify the plant with the diagnostic key in Flora of Turkey (Edmonson 1978), but it could not

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be identified. Subsequently, as a result of the various relevant floras (Mathew, 2000; Merxmüller & Sauer, 1972; Shiskin, 1953; Coste, 1937; Bonnier, 1926; Boissier, 1879) and literature studies, the specimen was identified as *P. angustifolia*. The *P. angustifolia* sample was compared with herbarium samples from B, BM, BR, GAP, GJO, KEW, L, MHA, O, P, TAA, TUL, US, WU herbaria with online access (JSTOR, 2020), as shown in Table 1.

A description was written with the aid of the The European Garden Flora (Mathew, 2000), Flora of Turkey (Edmonson, 1978), Flora Europaea (Merxmüller & Sauer, 1972) and Flora of

the U.S.S.R (Shiskin, 1953), Flore de la France (Coste, 1937), Flore complete illustree en couleurs de France (Bonnier, 1926), and Flora Orientalis (Boissier, 1879). Plant specimens were stored at the Istanbul University Faculty of Pharmacy Herbarium (ISTE). Current scientific names of *Pulmonaria* species have been checked on International Plant Names Index. (IPNI, 2020) Morphological photographs were taken with an iPhone X. The measurements were made with the ImageJ© program.

RESULTS AND DISCUSSION

Pulmonaria angustifolia L. First published in Sp. Pl.: 135 (1753)

Table 1: The examined herbarium samples and their herbarium numbers.

Herbarium Number	Origin	Herbarium Code	Collector	Date
B 10 0741930	Germany.	B	R. Hand	2017
BM000657894	Netherlands.	BM	-	-
BR0000014441400	Belgium.	BR	J. Lambinon	1954
GAP001846	France.	GAP	-	-
GJO_0081816	Austria.	GJO	B. Ocepek	2009
K001085765	Switzerland.	KEW	S.Coll	1822
K001085767	Austria.	KEW	-	1828
K001085763	Italy.	KEW	-	1822
K001085764	Italy.	KEW	-	1828
K001085766	Italy.	KEW	-	1828
L2761522	Poland.	L	-	-
MHA 0 067 353	Russian Federation.	MHA	-	1948
MHA 0 067 347	Russian Federation.	MHA	V. Kuvaev - Danilov	1980
O 583039	Sweden.	O	-	-
O 583044	Sweden.	O	-	1880
O-V2242315	France.	O	-	-
O-V2242330	Czechia.	O	-	-
O 583032	Sweden.	O	-	1938
P00505801	Sweden.	P	-	1849
P00505792	Sweden.	P	-	-
P00505793	Sweden.	P	-	-
P00505781	Romania.	P	-	-
P00505791	Sweden.	P	-	1856
P00505730	Germany.	P	Woth	-
P00505739	Hungary.	P	J. Wiesbaur S. J.	1877
P00505740	Hungary.	P	C. Müller - W. Retzdorff	1877
P00505630	France.	P	Rabou	1873
TAA0128370	Russian Federation.	TAA	-	-
TAA0026605	Estonia.	TAA	H. Tamm	1962
TAA0026606	Estonia.	TAA	M. Kask - L. Viljasoo	1974
TUL 005 396	Russian Federation.	TUL	I.S. Sheremetyeva	1988
TUL 005 401	Russian Federation.	TUL	A.I. Alyushin	1976
TUL 005 397	Russian Federation.	TUL	-	1987
.02910630	France.	US	L. Corbiree	-
.078000	Austria.	WU	Hofbauer M. - Berger A. - Flatscher C. - Gilli & D. Reich	2014

Synonym: *Pulmonaria azurea* Besser, *Pulmonaria tuberosa* Schrank, *Pulmonaria angustifolia* subsp. *azurea* (Besser) Gams, *Pulmonaria angustifolia* subsp. *tuberosa* (Schrank) Gams.

Description

Perennial; rhizome short, black, with extension like cord. Stems low, hairy, 15-30 cm, radical leaves unmarked, narrow, up to 40 cm long, 5 cm wide, narrowly lanceolate, very gradually narrowed to the base, with setae, not or only very slightly glandular. Cauline leaves sessile, narrowly lanceolate-linear, acute, vaguely decurrent, both surfaces with coarse hair and bristles. Inflorescence bracteate cymes, at apex of stem with lateral branches, in shortly cluster, bristly-hairy and also vaguely glandular. Calyx cylindrical, toothed, 1.5-2.5 mm, densely pubescent, slightly glandular. Calyx in fruit very thin and short. Corolla campanulate, bright blue or violet blue, corolla tube hairless inside below the ring of hairs in throat. Nutlets ovoid, 4-3.5 mm high, subglabrous. The general view of *P. angustifolia*, the glandular hairs on the calyx, the corolla and the calyx are given in Figure 1.

General distribution: Europe, Central Asia, Turkey (as shown in Figure 2,3),

Flowering time: April.

Examined specimen: A2 Bursa: Mustafakemalpaşa district Suuçtu waterfall, near the walking path, 450m, 21 April 2019, B.Olcay, 117019 (ISTE).

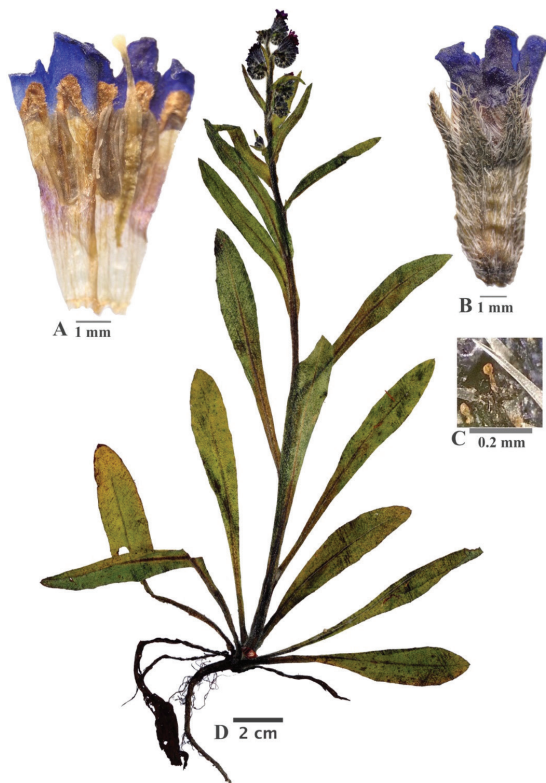


Figure 1. A: Corolla, B: Calyx, C: the glandular hairs on the calyx, D: general view of *P. angustifolia* L.

The *Pulmonaria* species are found in humus-rich soil, often in shade, but some also occur in sunny places, such as *Pulmonaria angustifolia*. The distribution area of *P. angustifolia* is considered to be quite small in Turkey. The fact that this specimen could not be found by anyone for many years supports this information. The *Pulmonaria* genus is represented by 4 species in Turkey (Edmonson 1978). But 2 of them are mentioned as doubtful records. With this study, the presence of *P. angustifolia*, is confirmed. The number of *Pulmonaria* species is increased with *P. angustifolia*, and updated, and as a result, it amounts to 3 species. According to Flora of Turkey, *P. officinalis* might have been cultivated in the vicinity of Istanbul, but confirmation is still needed regarding the presence of this species. The identification key to *P. angustifolia* is given below.

Identification key to *Pulmonaria angustifolia* L.

- 1. Basal leaves with cordate to truncate at base.....**2.**
 - 2. Summer leaves unspotted or with faint green spots; lamina shorter than petiole.....***P. obscura***
 - 2. Summer leaves white-spotted; lamina longer than petiole***P. officinalis***
- 1. Basal leaves attenuate into a petiole**3.**
 - 3. Stem 30-50 cm, corolla tubes pubescent within below the ring of hairs in throat. Cauline leaves rounded to subcordate at base.....***P. dacica***
 - 3. Stem 15-30 cm, corolla tube glabrous inside below the ring of hairs in throat.
 - Cauline leaves not rounded to subcordate at base.....***P. angustifolia***

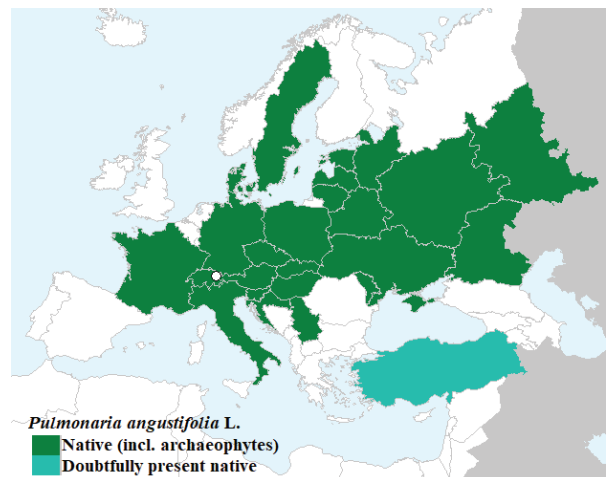


Figure 2. Distribution map of *P. angustifolia* in Europe, Central Asia (Valdes, 2011).

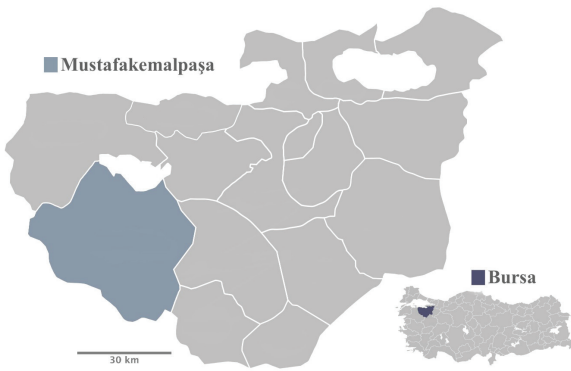


Figure 3. Distribution map of *P. angustifolia* in Turkey.

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