

***Anchusa stylosa* subsp. *spruneri* (Boraginaceae) and *Dipsacus pilosus* (Dipsacaceae) - new in the flora of North Macedonia**

Aco Teofilovski

Public Enterprise Nacional Forests, Pero Nakov bb, 1000 Skopje, North Macedonia

e-mail: acoteofilovski@hotmail.com

Abstract

Anchusa stylosa subsp. *spruneri* and *Dipsacus pilosus* are reported for the first time in the native flora of North Macedonia. The first taxon was recorded in the urban area of the city of Skopje, while the second one in an alder forest in the vicinity of Kolešino village (Strumica). The phytogeographical significance of the new floristic records is discussed.

Key words: Kolešino village, new records, Skopje, phytogeography

Introduction

The floristic studies in North Macedonia continuously disclose new taxa for the country flora [Kostadinovski et al. (2019), Teofilovski (2019), etc.]. Such new records are often of phytogeographical importance, improving the knowledge for the general distribution of the taxa and the phytogeographical relations in the wider region. The new floristic records indicate a need of intensification of the floristic studies throughout the whole territory of the country. During the author's recent field works, conducted in various parts of North Macedonia, a number of taxa that were not previously known from this territory were discovered, of which two are reported in this paper.

Material and methods

Plant specimens were collected and photographed during the field work. They were herbarized according to the standard methods and stored in the private herbarium of the author. Identification was performed according to Hayek (1931), Hansen (1976), Selvi and Bigazzi (2003), Petrova (2012), etc. The general distribution of *Anchusa stylosa* subsp. *spruneri* and the recorded locality of *Dipsacus pilosus* in North Macedonia are mapped.

Results and discussion

***Anchusa stylosa* subsp. *spruneri* (Boiss.) Selvi & Bigazzi (Figs. 1, 2)**

Record in North Macedonia: Skopje, 1,1 km SE from the train station, construction site, 41°58'59.80"N, 21°27'14.49"E, 22.4.2019, leg. & det. A. Teofilovski.

This is a first record of this subspecies in the flora of North Macedonia. On the discovered locality, in a densely populated area of Skopje, only a small population of c. 10 individuals were found, growing on a freshly cleared and flattened construction site. Individuals belonging to *A. stylosa* M. Bieb. subsp. *stylosa*, otherwise observed in a few other parts of the urban area of Skopje, were not found on the locality.

So far, the range of *A. stylosa* subsp. *spruneri* was considered restricted to a small area in S Greece and two localities in SW Bulgaria. In the former country it was known from: Sterea Ellas (Attika, Viotia), western Aegean islands (Egina, Petalii), and NW Peloponnese (Acrocorinthos), while in the second one from Ivailovgrad on the East Rhodopes and Tsarevo on the Black Sea coast (Selvi and Bigazzi 2003; Dimitrov 2009, sub *A. spruneri* Biss.). The above cited chorological data of *A. s.* subsp. *spruneri* from Greece are based on abundant herbarium collections from 19th century, while the attempts for field confirmation during the work on revision of the genus *Anchusa* L. in the flora of this country were unsuccessful (Selvi and Bigazzi 2003). Therefore,

the cited authors considered this taxon in "in strong decline because of the changes in land-use and agricultural techniques which have recently occurred in this densely populated area". The literature data from NE Greece and the Northern Aegean islands (Thasos, Samothraki) (Stojanov and Kitanov 1944, 1946) were considered by Selvi and Bigazzi (2003) as erroneous reports. Despite the recent discovery of this taxon in the neighboring parts of Bulgaria (Dimitrov 2009), the latter report still need a herbarium confirmation.

Having in consideration the previously known distribution range of *A. s. ssp. spruneri*, the new locality in Skopje, in the northern part of North Macedonia, represents its large extension toward central part of the Balkan Peninsula. The closest locality is Ivailovgrad in S Bulgaria, 400 km southeast-east. The rest of the subspecies known localities, several in S Greece and one on the Bulgarian Black Sea coast, are situated 450 km southeast-south and 530 km east, respectively.

A. stylosa ssp. *spruneri* was originally described as a separate species (Boissier 1849, as *A. spruneri* Boiss.), while later it was taxonomically variously considered: as synonym of *A. stylosa* (Boissier 1879), variety of *A. stylosa* (Halácsy 1902) and separate species (Guşuleac 1929, Hayek 1931, Chater 1972). Recently, Selvi and Bigazzi (2003) proposed its subspecific rank within *A. stylosa*, which is now widely accepted [Valdés (2011), Dimopoulos et al. (2013), etc.].

According to Selvi and Bigazzi (2003), *A. s. subsp. spruneri*, the only recognized subspecies of *A. stylosa*, differs from subsp. *stylosa* only by its shorter style and shorter corolla with an indication that intermediate forms occur. These authors considered as hardly reliable the other diagnostic characters used in the literature (more strigose indumentum, larger cauline leaves and longer floral pedicels), because these characters are very variable even in the type subspecies of *A. stylosa*, and thereby proposed the following key:

1 Corolla tube 8–10 mm, $1\frac{1}{2}$ –3 times as long as calyx; style 2–3 times as long as calyx ... **A. s. subsp. stylosa**

2 Corolla tube 6–7 mm, c. $1\frac{1}{4}$ times as long as calyx; style not more than $1\frac{1}{2}$ times as long as calyx ... **A. s. subsp. spruneri**

A. stylosa is an annual synanthropic plant, distributed in parts of SE Europe and Asia Minor. Beside North Macedonia, it occurs in the following European countries: Albania, Greece, Bulgaria, Romania, Moldavia and Ukraine (Crimea), while as an alien species with unknown status it is reported from Spain (Valdés 2011). All literature data from North Macedonia refer to *A. s. subsp. stylosa*. It is distributed in much of the country territory with an exclusion of the north-east, north-west and west parts. It grows on various ruderal and cultivated places, hilly pastures and stony places (see Matevski 2010).



Figure 1. *Anchusa stylosa* subsp. *spruneri*. Plant (a) with a detail of inflorescence (b), inflorescence (c) (Photo. A. Teofilovski)



Figure 2. General distribution of *Anchusa stylosa* subsp. *spruneri* (●), underlined symbol represents new record in North Macedonia

In "The Flora of Republic of Macedonia" four more species of the genus *Anchusa* L. (s. str.) are presented for the country flora: *A. hybrida* Ten., *A. italica* Retz., *A. officinalis* L., and *A. procera* Besser (Matevski 2010). Additionally, Teofilovski (2011) from the periphery of the city of Skopje reported *A. thessala* Boiss. & Spruner, an annual species which is by its habitus quiet similar to *A. stylosa* subsp. *spruneri* but strongly differs in the fruits morphology and the color of the corolla.



Figure 3. *Dipsacus pilosus* (Photo: A. Teofilovski)

Dipsacus pilosus L. (Figs. 3, 4)

Record in North Macedonia: Strumica, the alder forest close to NW periphery of Kolešino village, 250 m, 15.8.2018, leg. A. Teofilovski, D. Mandzukovski, det. A. Teofilovski.

This is a first record of this species in North Macedonia. During the extensive field observation in the vicinity of Kolešino village, only a small group of 7-8 specimens were recorded, growing on a dump shady place in an alder forest. *D. pilosus* grows together with the following plant species: *Alnus glutinosa* (L.) Gaertn., *Angelica sylvestris* L., *Frangula alnus* Mill., *Galium aparine* L., *Humulus lupulus* L., *Rubus caesius* L., *R. canescens* DC., *Silene baccifera* (L.) Roth, *Urtica dioica* L., etc.

Dipsacus pilosus is distributed in W, C, E and SE Europe, SW Russia, Crimea, the Caucasus, W Siberia and Anatolia (Hansen 1976, Petrova 2012, Devesa 2007). Among the countries neighbouring North Macedonia, this species occurs in Serbia and Bulgaria, while missing from Greece and Albania (Devesa 2007, Dimopoulos et al. 2013, Barina et al. 2017), and the most probably also from Kosovo. In the territory of Serbia (incl. Kosovo) it has sporadic distribution (Diklić 1973) but according to the available literature it is not reported from the southern part and Kosovo. In Bulgaria it occurs in various floristic regions, including the West Frontier Mountains, close to the state border with North Macedonia (Petrova 2012). Slovenia, Croatia, Bosnia and Herzegovina and Romania are the rest of the Balkan countries in which this species also occurs (Domina 2017, Mila-nović et al. 2011). Having in consideration the occurrence of *D. pilosus* in SW Bulgaria, its presence in SE North Macedonia was expected in some extent.

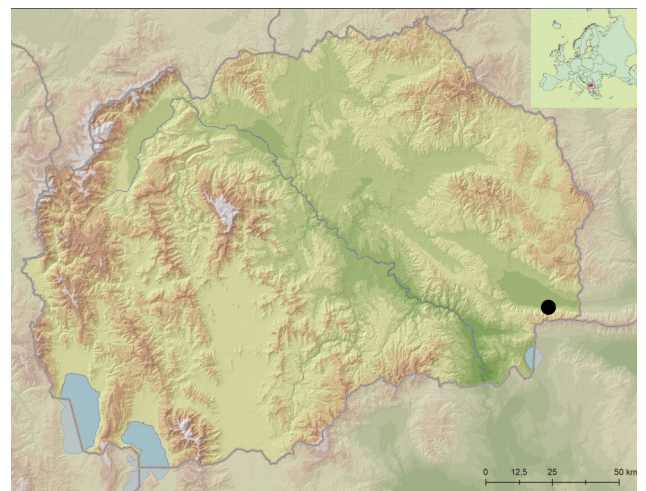


Figure 4. Distribution of *Dipsacus pilosus* (●) in North Macedonia)

The genus *Dipsacus* L. comprises c. 20 species distributed in Europe and Mediterranean region, SW and S Asia and W and E Africa (Devesa 2007). Six of eight representatives in the European flora occur in the Balkan Peninsula (Hansen 1976). In the flora of North Macedonia, besides *D. pilosus*, two additional species of this genus are also present - *D. fullonum* L. and *D. laciniatus* L., both of them frequently occurring in various open habitats in many regions of the country. *D. pilosus* noticeably differs from both of them by its more slender habitus, petiolate cauline leaves, smaller and globose capitulas, etc.

Conclusions

Anchusa stylosa subsp. *spruneri* and *Dipsacus pilosus* are reported as a new native subspecies and species, respectively, in the flora of North Macedonia.

Anchusa stylosa subsp. *spruneri* was recorded in the urban area of Skopje. The new record for this taxon is of a phytogeographical importance, significantly extending its distribution area toward central part of the Balkan Peninsula. The previously known localities are situated in S Bulgaria (400 km southeast-east), E Bulgaria (530 km east), and S Greece (450 km southeast-south) from the newly recorded locality in North Macedonia.

Dipsacus pilosus was recorded in an alder forest close to Kolešino village (Strumica). Its presence on the territory of North Macedonia was expected in some extent as it was already known from SW part of Bulgaria.

Acknowledgements

The author is grateful to the revivers, Mitko Kostadinovski and the anonymous one, for the useful suggestions.

References

Barina, Z., Mullaj, A., Pifkó, D., Somogyi, G., Meco, M., Rakaj, M., 2017: Distribution maps. In: Barina, Z. (ed.): Distribution atlas of vascular plants in Albania. Hungarian Natural History Museum, Budapest, 47-445.

Boissier, E., 1849. Diagnoses Plantarum Orientalium Novarum, 1, no. 11. Paris: Ducloux, 98-99.

Boissier, E., 1879. Flora Orientalis, 4. Geneva et Basileae: Georg, 150-162.

Chater, A.O., 1972. *Anchusa* L. In: Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M., Webb D.A. (eds.). Flora Europaea 3. Cambridge: Cambridge University Press, 106-109.

Devesa, J., A., 2007. *Dipsacus* L. In: Castroviejo S. et al. (eds.). Flora Iberica Vol. XV, Rubiaceae - Dipsacaceae, Real JardíBotánico. Madrid, 269-276.

Diklić, N., 1973. *Dipsacaceae* B. Juss. Flore Republique Socialiste de Sebie. Vol. V. Academie Serbe des Sciences et des Arts, Beograd, 536-584. (In Serbian),

Dimitrov, D., 2009. *Anchusa spruneri* Boiss. In: Greuter, W. , Rhaus, Th. (eds.) Med-Checklist Notulae, 28, Willdenowia, 39: 335-345.

Dimopoulos, P., Raus, Th., Bergmeier, E., Constantinidis, Th., Iatrou, G., Kokkini, S., Strid, A., Tzanodacis, D., 2013. Vascular flora of Greece: an annotated checklist, Englera. 31: 1-372.

Domina, G., 2017. *Dipsacaceae*. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity.

Guşuleac, M., 1929. Species Anchusae generis Linn. hucusque cognitae. Feddes Repertorium 26: 286-322.

Halácsy, E., 1902. Conspectus Florae Graecae, 2. Lipsiae: Engelmann, 321-330.

Hansen, A., 1976. *Dipsacus* L. In: Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M., Webb D.A. (eds.). Flora Europaea. Vol. 4. The University Press, Cambridge, 58-59.

Hayek, A., 1931. Prodrromus Florae Peninsulae Balcanicae. Repertorium Specierum Novarum Regni Vegetabile, Beihefte 30 (2): 58-67.

Kostadinovski, M., Čušterevska, R., Matevski, V., 2019. *Anisantha diandra* (Roth) Tutin and *Ochlopoa infirma* (Kunth) H. Scholz - new species of *Poaceae* family in Republic of Macedonia. Contributions, Section of Natural, Mathematical and Biotechnical Sciences, MASA, 40,2, 273-276

Matevski, V., 2010. The Flora of the Republic of Macedonia, II (1). Macedonian Academy of Sciences and Arts, Skopje, 1-187. (In Macedonian)

Milanović, Đ., Brujić, J., Stupar, V., 2011. Reports 64-72. In: Vladimirov V., Dane F., Matevski V., Kit Tan (eds.). New floristic records in the Balkans: Phytologia Balcanica, 17(1): 141-144.

Petrova, A., 2012. *Dipsacaceae* Juss. In: Kožuharov S. I. , Peev D. R. (eds.) Flora Republica Popularis Blgaricae.

- Vol. XI. Academia Scientiarum Bulgarica, Institutum Botanicum cum Horto, Sofia, 25-82. (In Bulgarian)
- Selvi, F., Bigazzi, M., 2003. Revision of genus *Anchusa* (Boraginaceae-Boragineae) in Greece. Botanical Journal of the Linnean Society. 142(4): 431-454.
- Stojanov, N., Kitanov B., 1944. Beitrag zur Kenntnis des Flora und der Vegetationsverhältnisse der Insel Samothrake. Godišnik Sofijskija Universitet Fizičko-Matematičeski Fakultet, 3 (Estestv. Istorija) 40: 403–464.
- Stojanov, N., Kitanov, B., 1946. Flora der Insel Thasos. Godišnik Sofijskija Universitet Fizičko-Matematičeski Fakultet, 3 (Estestv. Istorija) 42: 89–196.
- Teofilovski, A., 2011. Contributions to the flora of the Republic of Macedonia. Private edition, Skopje, pp. 1-142. (In Macedonian with English summary)
- Teofilovski, A., 2019. *Pleurospermum austriacum* (L.) Hoffm. (*Apiaceae*), a new species in the flora of the Republic of Macedonia. Botanica Serbica, 43(1): 113-115.
- Valdés, B., 2011. *Boraginaceae*. – In: Euro+Med Plantbase - the information resource for Euro Mediterranean plant diversity.

***Anchusa stylosa* subsp. *spruneri* (Boraginaceae) и *Dipsacus pilosus* (Dipsacaceae) – новитети во флората на Северна Македонија**

Ацо Теофиловски

Во текот на неодамнешните флористички истражувања на авторот во различни делови на Северна Македонија беа регистрирани следните два таксони кои досега не беа познати за флората на оваа земја: *Anchusa stylosa* subsp. *spruneri* и *Dipsacus pilosus*.

Anchusa stylosa subsp. *spruneri* е регистрирана во густо населениот дел од Скопје, каде на едно свежо расчистено градилиште се пронајдени само десетина примероци. Овој подвид се разликува од *A. stylosa* M. Bieb. subsp. *stylosa* со пократката венечна цевка и столбче чии должини не надминуваат $1\frac{1}{4}$ односно $1\frac{1}{2}$ од должината на чашката.

A. stylosa subsp. *spruneri* беше познат за неколку локалитети во јужна Грција (хербариумски податоци од 19^{ти} век), еден локалитет во јужна и еден во југоисточна Бугарија. Новото наоѓалиште во Скопје е со фитогеографско значење претставувајќи проширување на ареалот за неколку стотини километри кон централните делови на Балканскиот Полуостров.

Dipsacus pilosus е регистриран во околина на Струмица, во евовата шума покрај селото Колешино. Опсервираната популација се состои од само 7-8 примероци. Овој вид е со поширок евроазиски ареал кој на Балканскиот Полуостров е присутен уште и во флорите на Словенија, Хрватска, Босна и Херцеговина, Србија и Бугарија.