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CHOROLOGY AND HABITATS OF SOME PLANTS IN THE REPUBLIC OF MACEDONIA

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ABSTRACT: In this article are disclosed chorological and habitat data for 17 taxa in the flora of the Republic of Macedonia. *Chamaecytisus absinthioides* subsp. *absinthioides*, *C. absinthioides* subsp. *multiflorus* and *Solidago virgaurea* subsp. *minuta* are recorded for the first time in the flora of the Republic of Macedonia, while new finding sites are added for: *Juniperus sabina*, *Dianthus diffusus*, *D. formanekii*, *D. leucophoeniceus*, *Cotoneaster mariana*, *Genista subcapitata* var. *holosericea*, *G. subcapitata* var. *mariovoensis*, *Vicia pisiformis*, *Alkanna graeca*, *Hyssopus officinalis*, *Morina persica*, and *Knautia longifolia*. The presence of *Juniperus sabina* and *Dianthus haematochalyx* subsp. *pindicola* on the Nidže mountain is confirmed and also for the first time concrete data for their finding sites and habitats on this mountain are given. The lowest finding site in the Republic of Macedonia of *Abies borisii-regis* is recorded.

Keywords: chorology, habitat, flora, dendroflora, taxa, new finding sites

1 INTRODUCTION

The Republic of Macedonia is situated in southwestern part of Balkan Peninsula. Its rich flora, developed as a result of its diverse climate and geological composition, was the main reason for extensive botanical researches carried out since the first half of the 19th century.

Our field floristic and vegetation explorations of vascular flora, during the last two decades, encompassed different regions of the Republic of Macedonia, predominately mountain in its western, southern and eastern part (Mt Shar Planina, Mt Suva Gora, Mt Bistra, Mt Nidže, Mt Kozuf, Mt Plackovica, Mt Osogovo etc.). Plants of different systematic groups were collected and observed whereby taxa which previously was not known as well as new finding sites for certain rare taxa were discovered. Such discoveries show that Macedonian flora is still insufficient known and require further investigations.

Chamaecytisus absinthioides subsp. *absinthioides*, *C. absinthioides* subsp. *absinthioides* var. *multiflorus* and *Solidago virgaurea* subsp. *minuta* are discovered for the first time in Macedonia. New finding sites are discovered for: *Juniperus sabina*, *Dianthus leucophoeniceus*, *D. formanekii*, *D. diffusus*, *Cotoneaster mariana*, *Genista subcapitata* var. *holosericea*, *G. subcapitata* var. *mariovoensis*, *Vicia pisiformis*, *Alkanna graeca* subsp. *graeca*, *Hyssopus officinalis*, *Morina persica*, and *Knautia longifolia*. *Juniperus sabina* and *Dianthus haematochalyx* subsp. *pindicola* are rediscovered on Mt Nidže and for the first time concrete finding sites and habitats are presented. Also were discovered the lowest finding site of *Abies borisii-regis* in the Republic of Macedonia.

For each taxon are provided literature distribution data in Macedonia which alongside with newly discovered finding sites are presented on distribution map. Some taxonomic issues regarding *Dianthus leucophoeniceus*, *D. haematochalyx* subsp. *pindicola*, *D. diffusus*, *Genista subcapitata* and *Solidago virgaurea* subsp. *minuta* are shortly discussed. Approximate general range of distribution for each taxon is cited.

2 MATERIALS AND METHODS

During the field research herbarium specimens and also habitat data were collected for each taxa. Herbarium specimens are deposited in the private herbarium of collectors. In some cases herbarium material was not collected and finding sites are designated based only on observation or photos which is indicated in the text. The specimens was determined according The Flora of the Republic of Macedonia (Micevski, 1995-2010), Flora Europaea (Tutin et al. eds., 1964-1980), Prodromus florae peninsulae Balcanicae (Hayek, 1927-1933), Mountain flora of Greece (Strid & Tan, eds., 1987, 1991), Flora Helenica (Strid & Tan, eds., 1997, 2002) and also some other floras and monographic works.

3 RESULTS

3.1 *Abies borisii-regis* Mattf.

Mt Kožuf - Konska Reka gorge, 310-360 m, 8.2011, observation D. Mandzukovski.

In the Konska Reka gorge were found two individuals about 5 m tall, one on 310 m altitude and other one on 360 m. Both localities represent a small thermo-mezophilous refugium in area of thermo-xerophilous community *Phyllireo - Carpinetum orientalis arbustosum andrachnis* Em at all. prov. Alongside with both these individuals of *A. borisii - regis* grow *Fagus silvatica* subsp. *moesiaca*, *Taxus baccata*, and *Platanus orientalis*. This is the lowest finding site so far known in Macedonia. Previously known lowest finding site was also on Mt Kožuf - near Petrovo Selo, in the area of ass. *Orno-Quercetum petraeae* on altitude between 490 and 520 m (Gudevski & Rizovski, 1968).

Balkan endemic species widespread in mountains of Macedonia, Greece and Bulgaria. (Fig. 5)

3.2 *Juniperus sabina* L.

Mt Nidže - Dolgiot Rid, stony places, on dolomitic marble, 1790 m, 23.7.2010, observation and photos D. Mandzukovski & A. Teofilovski.

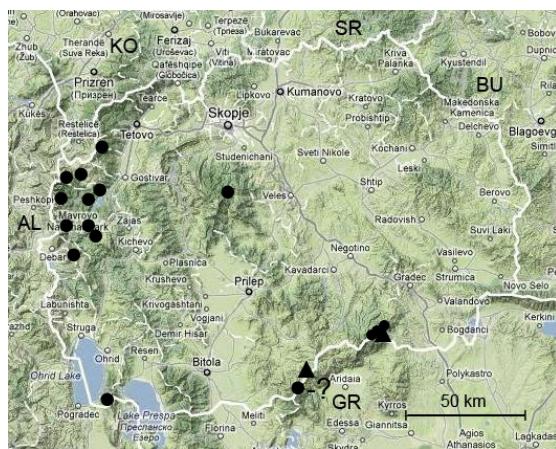


Figure 1: Distribution of *Juniperus sabina* in Macedonia
 (▲new finding sites, ● literature data)

Mt. Kožuf - Mala Rupa, steep rocky places, limestone substrate, 1770 m, 27.7.2011, observation and photos D. Mandzukovski.

According Em (1965) occurs on Mt Bistra, Mt Stogovo, Mt Korab and Mt Rudoka with isolated finding sites on Mt Jakupica, Mt Galičica (Mala Galičica - Poljce) and Mt Kožuf. Micevski (1985) quoted this species as very frequent on Mt Bistra, Mt Korab, Mt Krčin (Dešat), Mt Galičica, Mt Koža, Mavrovska Reka, Radika and Adžina Reka, Acevski (2000) for Mt Galičica (Stara Galičica) and also Mandzukovski (2009) for Mt Kožuf - Čiči Kaja and Ešek Burun. Velenovský (1922) quoted this species for Mt Nidže without concrete locality so it is unclear whether he found this species on Macedonian or on Greek territory of this mountain. The new finding site Dolgriot Rid is first and concrete confirmation of this general record for Mt Nidže.

Areal of this species includes mountains of C & S Europe and W & C Asia, from Spain to E Siberia. (Fig. 1)

3.3 *Dianthus leucophoeniceus* Dörfl. & Hayek

Resen - 0,4 km west from the pass Bukovo, dry grassy place, siliceous substrate, 1230 m, 23.6.2010, leg. A. Teofilovski.

Tetovo - 2,5 km NE from Orashje village, grassy place, serpentine substrate, 450 m, 6.6.2009, leg. A. Teofilovski.

Previously recorded for: Skopje - Osinčani (Rohlena, 1935); Veles (Bornmüller, 1933); Skopje - Mt Žeden, Žeden gorge, Raduša, Katlanovska Banja; Taor gorge; Mavrovo - Mavrovi Anovi, Vrben; Mt Korab - Žužnje; Mt Stogovo - Gari (Micevski, 1993); Mt Suva Gora - Stanika, Gaber, Lokva, Novo Selo (Teofilovski, 2011).

Petals length of collected specimens fits to subsp. *brachypetalum* Acht. et Lindtner but it is a doubtful taxon.

Balkan endemic species occurs in: Kosovo, Albania, Macedonia, and Greece - N Pindus. (Fig. 2 and 3)



Figure 2: *Dianthus leucophoeniceus* (Bukovo)

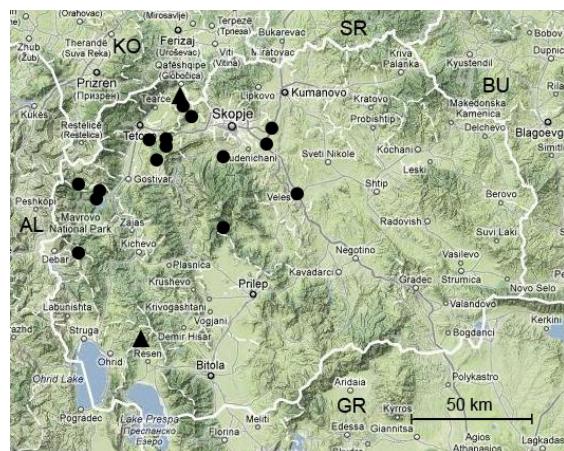


Figure 3: Distribution of *Dianthus leucophoeniceus* in Macedonia (▲new finding sites, ● literature data)

3.4 *Dianthus haematocalyx* Boiss. & Heldr. subsp. *pindicola* (Vierh.) Hayek

Mt Nidže - area from the right side of Suvi Dol to the top of Belo Grotlo, rocky places, limestone substrate, 1780-2120 m, 24.7.2010, leg. A. Teofilovski & D. Mandzukovski, 7.7.2011, leg. D. Mandzukovski.

This taxon was already recorded for Mt Nidze (Todorovski, 1970) but without concrete finding site. Despite this record, Micevski (1993) in the "Flora of Republic of Macedonia" do not mention this subspecies at all. Records of some authors for subsp. *sibthorpii* (Vierh.) Hay. in S Macedonia (see Micevski, 1993) may referes to subsp. *pindicola*.



Figure 4: *Dianthus haematocalyx* subsp. *pindicola* (Mt Nidže)



Figure 5: Distribution of *Dianthus haematocalyx* subsp. *pindicola* in Macedonia (▲new finding sites, ● literature data) and the lowest finding site in Macedonia of *Abies borisii-regis* (■)

All collected and observing plants on Mt Nidže have glaucous stem and leafs which do not fit with the description in protolog (Vierhapper jun., 1897) and some older floras (Hayek, 1927; Tutin, 1964). However Strid (1986, 1997) and Constantinidis (1999) do not consider this feature when delimit subsp. *pindicola*, which probably implies its taxonomical irrelevance regarding this subspecies. Plants from Mt Smolikas (NW Greece) which belong to this subspecies, according several photos in Greek Mountain Flora (2006-), are also glaucous. Some specimens from Nidže have almost linear leafs, thus approaching to subsp. *chaematoxalyx*.

Balkan endemic taxon occurs in: S Macedonia - Nidze, S Albania, and NW Greece. (Fig. 4 and 5)

3.5 *Dianthus formanekii* Borbás ex Formanek

Bitola - Bel Kamen peak, grassy place, siliceus supstrate, 1350 m, 17.6.2009, leg. A. Teofilovski.

Bitola - 2,6 km NW from Gorno Srpci village, grassy places, siliceus supstrate, 1060 m, 17.6.2009, leg. A. Teofilovski.

Previously recorded for: Kavadarci - Vataša; Prilep - Treskavec, Rasim-Bej (Micevski, 1993), Kanatlarci

(Bornmüller, 1925), "Kokaleny" (Velenovský, 1922); Bitola - Mojno, Črničani, Armatuš (Vandas, 1909), Lopatica (Micevski, 1993).

This species is endemic to S Macedonia and NW Greece. All previously known finding sites in both countries were on relative low altitude, between 500 and 800 m. (Fig. 5 and 6)



Figure 6: *Dianthus formanekii* (Bitola - Bel Kamen)

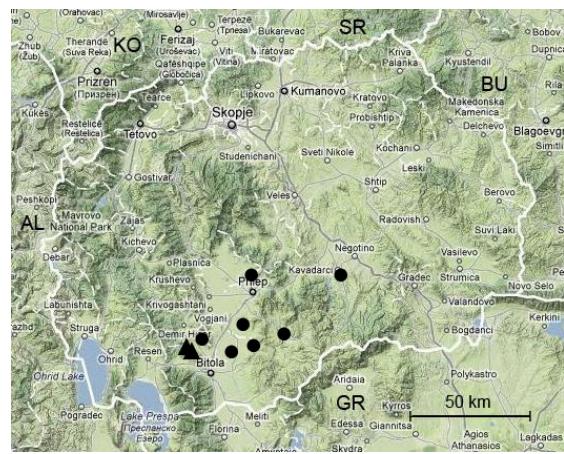


Figure 7: Distribution of *Dianthus formanekii* in Macedonia (▲new finding sites, ● literature data)

3.6 *Dianthus diffusus* Sipth. et Sm.

Mt Nidže - right site of Suvi Dol, in *Pinus sylvestris* forest, limestone supstrate, 1820 m, 19.7.2010, leg. D. Mandzukovski & A. Teofilovski.

A rare species in Macedonia, previously recorded only for: Mt Skopska Crna Gora; Straža - between Gostivar and Kičevo; Mavrovo - Koža, Vrben (Micevski, 1993).

The range of this species includes S & SE parts of Balkan Peninsula and some Aegean islands. It is closely related to another Balkan endemic *D. pubescens* Sipth. et Sm., which according some authors represent a synonym of *D. diffusus* (Strid, 1997). Our comparative examinations on one collection of *D. pubescens* from Mt Jakupica - near Kadina Reka (15.8.2010, leg. A. Teofilovski,

unpublished) and the specimen of *D. difusus* from Mt Nidže support their separate specific status. (Fig. 8)



Figure 8: Distribution of *Dianthus diffusus* in Macedonia (▲new finding sites, ● literature data)

3.7 *Cotoneaster mariana* And. A. et And. V.

Mt Bistra – atop Volkovija village, clearing in fir forest, 23.8.2010, leg. J. Acevski & B. Simovski.

Mariovo - near road between Gradešnica and Staravina villages (only one individual discovered), dry pasture on siliceous supstrate, 890 m, 23.7.2010, observation and photo D. Mandzukovski & A. Teofilovski, 7.7.2011 leg. D. Mandzukovski & J. Acevski.

Long time overlooked species relatively recently described from Mt Galičica where its distribution is common on elevation belt between 1400 and 1800 m, on limestone thermophilous habitats (Andonoski & Andonovski, 1996). There is also some another records for Mt Galičica (Acevski, 2000; Matevski & al., 2011). Ours investigations show also relatively common presents of *C. mariana* on this mountain (several collections and photos from different parts on elevation between 1250 and 1500 m, leg. and photogr. A. Teofilovski & D. Mandzukovski, Jun-July, 2010, unpublished).

Another known finding sites in Macedonia are: Mariovo - Manastir village (Andonoski, 1997), Mt Gradištanska Planina - between Malino and Alakince villages (Mandzukovski, 2001; Mandzukovski & Acevski, 2007), Poreče - a relatively large finding site near Krapa village (Mandzukovski, 2009).

Morphologically well defined species so far known only for Macedonia, but probably occurs also in some other S Balkan country, at least Albania. (Fig. 9 and 10)



Figure 9: *Cotoneaster mariana* (v. Gradešnica)

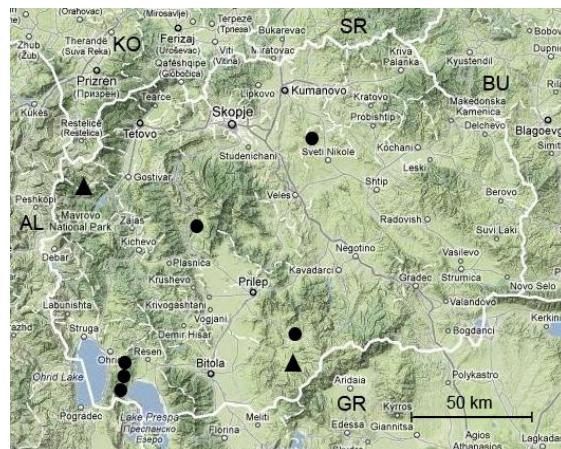


Figure 10: Distribution of *Cotoneaster mariana* in Macedonia (▲new finding sites, ● literature data)

3.8 *Chamaecytisus absinthioides* (Janka) Kuzm. subsp. *absinthioides*

Mt Suva Gora - area between Merovo village, Novo Selo village and locality Jablanica, road sites, forest clearings, and oak forests, 600-1000 m, 14.6.1998, 5.9.1998, 16.6.2011, leg. A. Teofilovski.

Mt Osogovo - c. 1km NW from Sasa village, sunny places on siliceous supstrate, 950 - 1200 m, 28.5.2012, leg. D. Mandzukovski

Mt Osogovo - southern slopes, widespread in atop of Novo Selo, Nebojani Kostin Dol villages, sunny places on siliceous supstrate, 800 - 1400 m, 03.12.2012, leg. D. Mandzukovski

Specimens from Mt Osogovo are closest to var. *absinthioides*, while specimens from Mt Suva Gora represent var. *multiflorus* Kuzm. Subsp. *absinthioides*, respectively var. *multiflorus*, is new for Macedonia.

C. absinthioides s.l. is known for several finding sites in Macedonia, mostly in its west part [several authors, sub *C. absinthioides* s.l. or its lower taxa (see Teofilovski, 2011)]. *C. absinthioides* s.l. [(probably belonging to subsp. *rodopaeus* (Wagn.) Kuzm.] recently was discovered also on Mt Šar Planina - 2,5 km W from

Rakovec village, 1290 m, (25.5.2011, leg. A. Teofilovski, unpublished).

Differences between *C. absinthioides* and W Anatolian species *C. eriocarpus* (Boiss.) Rothm. are not quite clear. Here we accept approach of Kuzmanov (1976) who regard *C. absinthioides* as separate species with range in: SE Jugoslavia (former), SW Bulgaria and N Greece. (Fig. 11 and 12).



Figure 11: *Chamaecytisus absinthioides* subsp. *absinthioides* var. *multiflorus* (Mt Suva Gora)

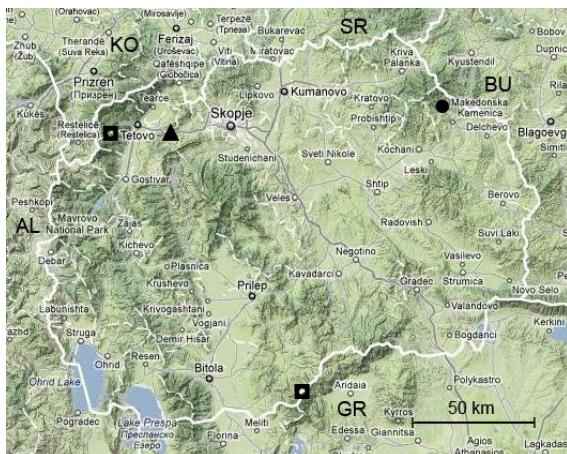


Figure 12: Distribution of *Chamaecytisus absinthioides* subsp. *absinthioides* (●), *C. absinthioides* subsp. *absinthioides* var. *multiflorus* (▲), and *Solidago virgaurea* subsp. *minuta* (■) in Macedonia

3.9 *Genista subcapitata* Pančić

[Syn.: *G. involucrata* auct. non Spach]

Mt Plačkovica - Varnica, rocky places, limestone substrate, 1100-1300 m, 7.2.2009, leg. D. Mandzukovski, 12.8.2009, leg. D. Mandzukovski & A. Teofilovski.

Mt Skopska Crna Gora - Crn Kamen, 1611 m, 7.7.2012, leg. Z. Nikolov.

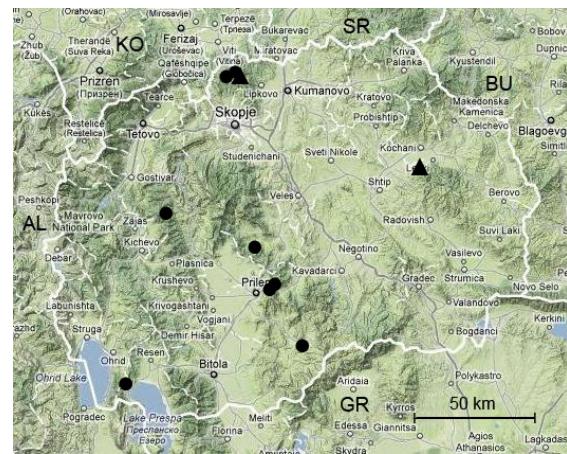


Figure 13: Distribution of *Genista subcapitata* in Macedonia (▲ new finding sites, ● literature data)

Mostly of collected specimens from Mt Plačkovica belong to var. *mariovoensis* Micevski & Matevski while few specimens belong to var. *holosericea* Micevski & Matevski. The specimens from Mt Skopska Crna gora probably represent typical *G. subcapitata*.

Balkan endemic species occurs also in: E & SE Serbia, W, S & SW Bulgaria, N Greece, and Albania. In Macedonia previously recorded for: Mt Skopska Crna Gora - Pržalj, Crn Kamen, Ostruga, Pešter (Grupče, 1958, sub *G. involucrata*), Babuna (Bornmüller, 1927, sub *G. involucrata*), Mt Dobra Voda (sub var. *grandiflora* Micevski & Matevski), Prilep - Kozjak and Pletvar (sub var. *holosericea*), Mariovo - Bešište village (sub var. *mariovoensis* Micevski & Matevski, 1998, Micevski, 2001), Galičica (Šmarda, 1968). According revision made by Micevski (2001) specimens from Mt Skopska Crna Gora recorded from Grupče (1958) as *G. subcapitata* (sub *G. involucrata*) actually belong to *G. albida* Willd. var. *pestalozzae* Boiss. However, our examinations of one collection from this mountain (leg. Z. Nikolov) confirm the presence of *G. subcapitata* although a few specimens have some branches bearing 1 (-2) axillary arranged flower below the capitula and thus somewhat approaching to *G. albida*. Existing of *G. albida* in Balkan Peninsula is questionable. (Fig. 13)

3.10 *Vicia pisiformis* L.

Mt. Suva Gora - Podgorica (in the vicinity of Miletino village), near forest road in the oak forest belt, siliceous substrate, 590 m, 15.6.2011, leg. A. Teofilovski.

Euro-caucasian species, very rare in Macedonia. So far was known only from: Mt Baba - over Velušina and Ostrec (Todorovski, 1970); Mt Šar Planina - Belovište (Teofilovski, 2011). (Fig. 14 and 15)



Figure 14: *Vicia pisiformis* (Mt Suva Gora)

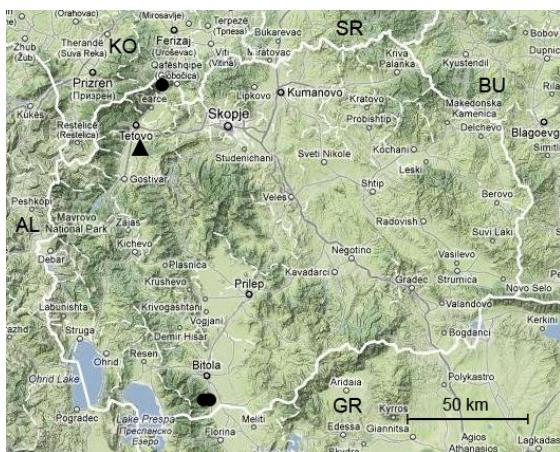


Figure 15: Distribution of *Vicia pisiformis* in Macedonia (▲new finding sites, ● literature data)

3.11 *Alkanna graeca* Boiss. & Spruner subsp. *graeca*
 Mt Suva Gora - 1,2 km NW from Tenovo village,
 pastures on siliceous substrate, 19.4.2012, leg. A.
 Teofilovski.



Figure 16: *Alkanna graeca* (Mt Suva Gora)

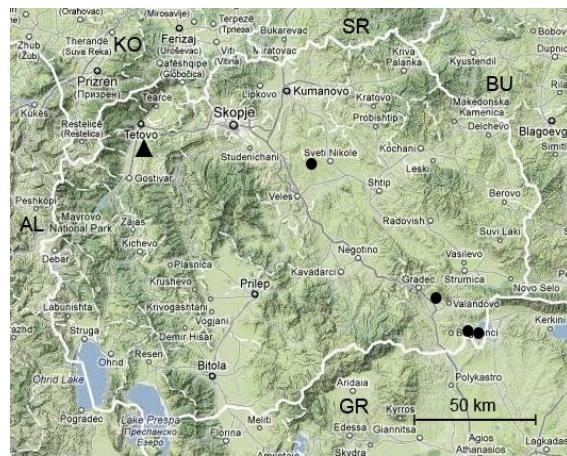


Figure 17: Distribution of *Alkanna graeca* in Macedonia (▲new finding sites, ● literature data)

Previously recorded from: Dojran - Mt Dub (Cirimotić, 1958), Dojran - between Star and Nov Dojran, Valandovo - Kalkovo village, Veles - Ivankovci village (Matevski, 2010).

A. graeca is an endemic to S Balkan. Subsp. *graeca*, is an endemic to Macedonia, Greece, and Albania while Bulgarian populations (S Pirin and Thracian lowlands - Hermenin) are distinguished in separate subsp. *slavjankeae* Kož. (Kožuharov, 1989). Velenovský (1922) quoted mountain ecotype subsp. *bæotica* (DC.) Nyman (sub *A. bæotica* DC.) for Mt Nidže but it is unclear whether he found this species on Macedonian or on Greek territory of this mountain. (Fig. 16 and 17)

3.12 *Hyssopus officinalis* L. subsp. *aristatus* (Godr.) Nyman
 [Syn.: *H. officinalis* subsp. *pilifer* (Griseb.) Murb.; *H. officinalis* var. *pilifer* Griseb.]

Kičevo - 0,4 km W of Prostranje village, stony places, limestone substrate, 1050 m, 23.9.2010, leg. A. Teofilovski & D. Mandzukovski.



Figure 18: *Hyssopus officinalis* subsp. *aristatus* (v. Prostranje)

Kičevo - near road between Velmevci and Železnec villages, stony and rocky places, limestone substrate, 760 - 820 m, 9.2010, leg. A. Teofilovski & D. Mandzukovski

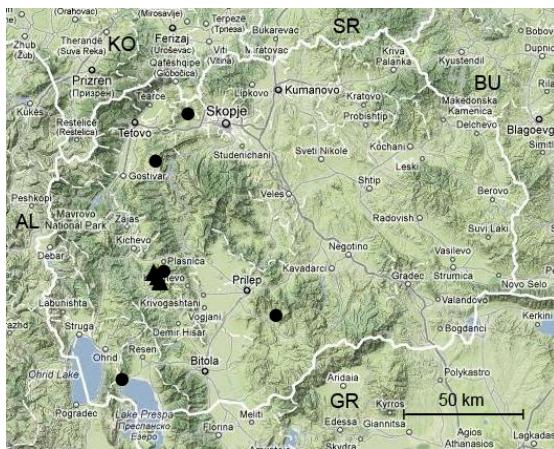


Figure 19: Distribution of *Hyssopus officinalis* subsp. *aristatus* in Macedonia (▲new finding sites, ● literature data)

Previously recorded for: Suvo Pole (Vandas, 1909, sub *H. officinalis* var. *pilifer*), W from river Vardar (Em, 1967, sub *H. officinalis* subsp. *pilifer*), Mt Žeden, Mt Suva Gora - Treska gorge, and Drenska Planina - Crna Reka gorge (Drenkovski, 1971, sub *H. officinalis* subsp. *pilifer*). Matvejeva (1965, sub *H. officinalis* var. *angustifolia* (M. B.) Briq.) quoted *H. officinalis* subsp. *officinalis* for Mt Žeden - Rašče village.

Subsp. *aristatus* is probably an Mediterranean taxa extending eastwards to Balkan Peninsula. (Fig. 18 and 19)

3.13 *Knautia longifolia* (W. et K.) Koch

Mt Šar Planina - Plat, grassy place, limestone substrate, 2050 m, 18.7.2012, leg. A. Teofilovski & D. Mandzukovski.

Mt Nidže - Belo Grotlo, open stony places and *Pinus sylvestris* forest, limestone substrate, 1790-1820 m, 5.8.2010, 12.8.2010, leg. A. Teofilovski & D. Mandzukovski.

Mt Nidže - Belo Grotlo, open stony places and *Pinus sylvestris* forest, limestone substrate, 1790-1820 m, 5.8.2010, 12.8.2010, leg. A. Teofilovski & D. Mandzukovski.



Figure 20: Distribution of *Knautia longifolia* in Macedonia (▲new finding sites, ● - literature data)

Probably a rare species in Macedonian mountain, previously recorded only for Mt Nidže (Micevski, 1978)

and Mt Pelister (Horvat, 1938). Todorovski (1967) cited this species as a synonym of *K. midzorensis* Form. for Mt Nidže - Kajmakalan and Mt Baba with Pelister, but later (1970) he cited only *K. midzorensis* for the same localities, without synonyms.

The range of *K. longifolia* includes: E Alps, E Carpathians and Balkan Peninsula. (Fig. 20)

3.14 *Morina persica* L.

Mt Plackovica - Varnica, stony places, limestone substrate, 1100-1300 m, 12.8.2010, observation and photos D. Mandzukovski & A. Teofilovski.

Mt Plackovica - above Zrnovci village, dry places, 600-800 m, 7.2009, observation D. Mandzukovski.

This species occurs in Macedonia mainly in its central part (many localities recorded by: Vandas, 1909; Jurišić, 1923; Bornmüller, 1926; Černjavski & all., 1937, sub *M. persica* subsp. *turcica* Hal.; Matevski & al., 2008 etc.) and also in SW Macedonia - Mt Galicica (Weber, 1951, sub *M. persica* subsp. *turcica*; Micevski, 1971), S Macedonia - Demir Kapija (Bornmüller, 1926; Soška, 1939), Bošava (Soška, 1939) and NE Macedonia - Gradište near Kratovo (Čušterovska, 2008).

The east eurimediterranean chorotype with general distribution in S Europe, C Asia, Turkey, W Syria, Lebanon, Iran, Afghanistan, W Himalayas, and Pakistan. (Fig. 21)

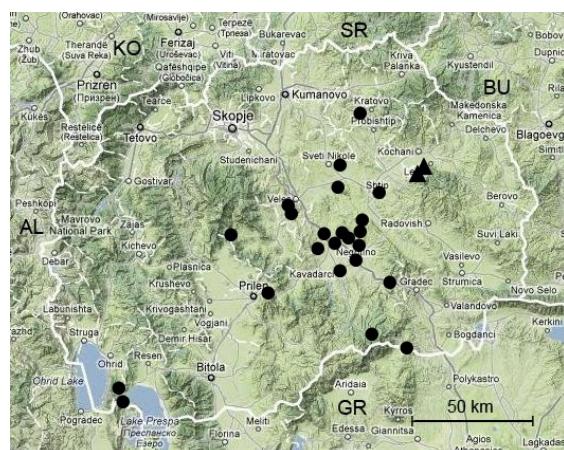


Figure 21: Distribution of *Morina persica* in Macedonia (▲new finding sites, ● literature data)

3.15 *Solidago virgaurea* L. subsp. *minuta* (L.) Arcang. [Syn: *S. virgaurea* subsp. *alpestris* (W.K.) Gaud.]

Mt Šar Planina - E slopes of Ceripašina, stony places, limestone substrate, 2120 m, 19.7.1988, leg. A. Teofilovski.

Mt Nidže - Bela Reka basin, stony places, limestone substrate, 2000 m, 12.8.2010, leg. A. Teofilovski & D. Mandzukovski.

Mt Nidže - right site of Suvi Dol, *Pinus sylvestris* forest, limestone substrate, 1780-1820 m, 25.7.2010, leg. D. Mandzukovski.

The subspecies is new for Macedonia. It represent an arctic-alpine ecotype connected with many intermediate forms to subsp. *virgaurea*. The latest is common taxon in the upper forest band in Macedonia, with general distribution in Europeae, W Asia and N Africa.

Hayek (1928-1931) included to this subspecies Balkan endemic taxon *S. virgaurea* L. var. *vestita* Hal. (sub *S. virgaurea* L. ssp *alpestris* (W.K.) Gaud. var.

vestita Hal., comb. illeg.). According examination of one collection from Mariovo - Zović (27.7.2010, leg. A. Teofilovski & D. Mandzukovski, unpublished) such combination has not justification. (Fig. 12)

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