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Floristic materials and critical notes on the genus *Orobanche* subgen. *Phelipanche* in Bulgaria.

Abstract

Stoyanov, K.: Floristic materials and critical notes on the genus *Orobanche* subgen. *Phelipanche* in Bulgaria. — Fl. Medit. 15: 461-476. 2005. — ISSN 1120-4052.

New specimen collections of the genus *Orobanche* subgen. *Phelipanche* (Pomel) Tzvel. as well as existing specimens in Bulgarian herbarium and published data have been revised and used for the creation of maps. New habitats for the species *O. arenaria* Borkh. (2), *O. mutelii* Schultz (4), *O. nana* Noë (2), *O. oxyloba* G .Beck (4), *O. purpurea* Jacq. (2) and *O. ramosa* L. (2) are reported. On the basis of information collected, *O. aegyptiaca* Pers. is excluded from the Bulgarian flora. The known host plants are discussed, comparing both herbarium data and the literature.

Introduction

In the Bulgarian flora, seven species of genus *Orobanche* L. subgen. *Phelipanche* (Pomel) Tzvel. are known and assigned to the sections Holoclada Novopokr. (*O. arenaria* Borkh. and *O. purpurea* Jacq.) and Pleioclada Novopokr. (*O. aegyptiaca* Pers., *O. mutelii* Sschultz, *O. nana* Noë, *O. oxyloba* G. Beck and *O. ramosa* L.). The aim of this study is to revise and represent the known chorological data about the members of subgen. Phelipanche in Bulgaria, as well as an analysis of the information about their host plants.

Material and methods

The new material used in this study was collected 2002-2005. An examination of specimens maintained in the Bulgarian herbarium SOM, SOA, SO was carried out. The chorological data was prepared using the UTM- grid, according to Kožuharov & al. (1983).Using this data, as well the data from some smaller collections (Nature Science Museum - Plovdiv, The Institute of Plant Genetic Resources - Sadovo and Natural Science Section of Burgas Museum), further distribution maps were created by the dSOA computer program (Stoyanov 2003). The floristic regions as described and numbered by Flora Republicae Bulgaricae I-X are shown in brackets after the UTM-code and on the maps (Figs. 1 - 7). The Floras and keys to vascular plants are abbreviated: FB1, FB3 - Flora of Bulgaria 1st and 3rd ed. (Stoianov & Stefanov 1925, 1948), FB4 - Flora of Bulgaria II, 4th

ed. (Stoianov, Stefanov & Kitanov 1967), FRB - Flora Republicae Bulgaricae X (Delipavlov 1995), KPB - A key to plants in Bulgaria (Cheshmedzhiev 2003), KVFB - A key to vascular plants in Bulgaria (Andreev 1992), CBVF - Conspectus of the Bulgarian Vascular Flora (Dimitrov 2002).

Identification key of species discussed:

1¹. Stem unbranched, erect. Calyx 5-dentate, the posterior tooth shorter than the antherior teeth or missing. .....Sect. ***Holoclada***
2¹. Stem in the higher part weakly squamate. Inflorescence lax, cylindrical. Flowers bent in one side. Calyx teeth shorter than the tube ..... *O. purpurea*
2². Stem squamate in the higher part. Inflorescence dense, commonly cone shaped. Calyx teeth equal or longer than the tube .....*O. arenaria*
1². Stem branched, rarely (in small specimens) unbranched, thin, often semi-inclined or bent at the base. Calyx 4-dentate. .....Sect. ***Pleioclada***
3¹. Bracts shorter than calyx. Corolla with mucronate lobes; Plants without glandular hairs ……..…….....……..*O. oxyloba*
3². Bracts equal to calyx. Corolla with rounded lobes, sometimes crenate; Plants with glandular hairs. 4
4¹. Corolla 10--15 mm long.....5
5¹. Calyx teeth shorter than the tube, mucronate. Corolla with rotundate lobes. .....*O. ramosa*
5². Calyx teeth longer than the tube, triangular, awl-like, frequently with an almost filiform extension. Corolla with mucronate lobes ...….....*O. nana*
4². Corolla 17--37 mm long.....6
6¹. Inflorescence usually lax. Corolla 20--37 mm long. Filaments inserted 2--3 mm above base of corolla. Anthers hairy on the sutures at the base .....*O. aegyptiaca*
6². Inflorescence usually dense. Corolla 17--22 mm long. Filaments inserted 5--6 mm above base of corolla. Anthers glabrous, or sparsely hairy on the sutures at the base .....*O. mutelii*

Results and discussion

I. Sect. *Holoclada* Novopokr.

1. ***Orobanche arenaria* Borkh.** (Fig. 1)

New and unpublished data: **34TGM45** (17.1) in collis saxosis mt. Rhodope occidentalis Čepino, 811 m, 23.07.1925, SV (Davidov), SOM 69762; Cepino ad pagum Lažene, 750 m, 24.06.1926, SV (Davidov), SOM 69763, SOM 69768 (sub *O. purpurea*); **35TKG85** (17.1), over Bratzigovo, 440 m, parasite on *Achillea*, 7.08.2003, SC (KS), SOA s/n; **35TLG15** (17.2) over Markovo, 400 m, parasite on *Achillea pannonica*, 1.06.2003, SC(KS), SOA 56536; **35TLG25** (17.2), over Asenovgrad, on herbaceous uncultivated lands, 18.05.1983, SV (Delipavlov), SOA 38243. The species is reported and confirmed by herbarium sheets for the regions 1.1 (FRB), 1.2 (FB1; Georgieff 1937; FB4, FRB), 4 (Georgieff 1937; FB4; FRB; KPB), 5.1 (Velenovsky. 1891; Urumov 1935, Georgieff

1937), 5.2 (Vihodcevsky 1971), 8 (Urumov 1930), 18 (FB1; KPB, FRB) and 19 (Jordanov 1942; FB; KVPB; FRB; CVFB; KPB) up to 1000 m. Floristic records without herbarium species exist from Sofia region (6) (FB1; Urumov 1930; Koeva 1972; FRB). The species is indicated for the regions 2 (FRB), 3 (KVPB; FRB; CVFB; KPB), 7 (FB1; FRB) and 10 (FRB). without evidence of herbarum specimens or floristic records. In FRB regions 5 and 8 are not reported but they are confirmed by herbarium specimens and floristic data. Our own collections of specimens and herbarium data confirm the distribution in the regions 1, 4.2, 5, 8, 17.1, 17.2, 18, 19 (Table 1) and the border of vertical distribution up to 811 m.

f. *euxina* Vel.

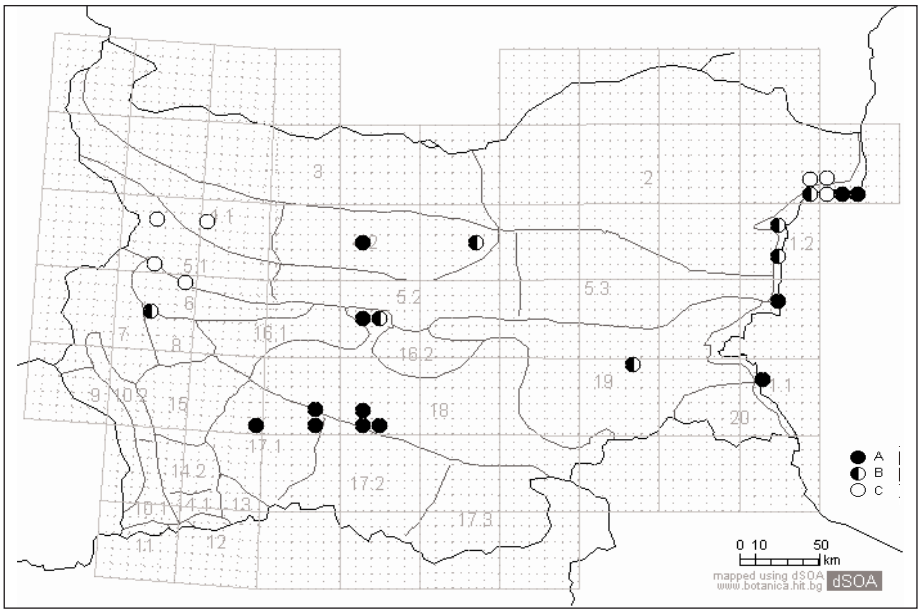

Fig. 1. *Orobanche arenaria* Borkh.: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

One specimen from the Southern Black Sea coast should be added to the distributional data of this form: **35TNG68** (1.1), Coast line, near to the Arkutino marshland, Sozopol, 10 m, 13.06.1963, SV(?), SOA s/n. This form is reported first for "the Coast" (FB1), but in the next publication the area is given as only the Northern Black Sea coast (Georgieff, 1937; FB4, FRB). It is indicated for the regions 2 and 4 (FRB) but is not confirmed by floristic records or herbarium specimens.

The host plants of *O. arenaria* are, according to the herbarium data (Table 2), *Achillea* - *A. millefolium* L., *A. coarctata* Poir. (FB4; FRB), *A. pannonica* and *Stachys recta* L. The host plants *Artemisia* (FB4; KBP; KPB3) - *A. campestris* (FB1), *Anthemis* (FB4) and other *Asteraceae* (FRB; KPB3), *Eryngium maritimum* L. (FB4), *Lamiaceae* (KVPB) are indicated, but this information is not confirmed by herbarium data.

Table 1: Distribution of genus *Orobanche* L. subgen. *Phelipanche* Novopokr. in Bulgaria - comparison by floristic regions (new data are preceded by an *).

#	taxon	horizontal distribution	
		literature data	herbar data
I	**Sect. *Holoclada* Novopokr.**		
1.	O. *arenaria* Borkh.	1, 2, 3, 4, 5.1, 5.2, 6, 7, 8, 10, 18, 19; up to 1000 m	1, 4.2, 5, 8, **17.1***, **17.2***, 18, 19; up to **811** m
	f. *euxina* Vel.	1.2, 2, 4	**1.1***, 1.2
2.	O. *purpurea* Jacq.	1.2, 2, 3, 4, 5.1, 5.2, 7, 8, 9, 10.2, 15, 16, 17, 18; up to 1000 m a. s. l.	1.2, 2, 3, 4, 5.1, 5.2, **5.3***, 7, 8, **10.1***, 15, 16, 17, 18; up to **1300*** m a. s. l.
	var. *hirsuta* G. Beck	5.2, 8, 17.1, 17.2	5.2, 8, 17.1, 17.2
II.	**Sect. *Pleioclada* Novopokr.**		
3.	O. *aegyptiaca* Pers.	1.2, 10, 5.3, 17.2, 17.3, 19	missing
4.	O. *mutelii* F. W. Schultz	4, 5.2, 10, 11, 17; up to 1000 m	**1.2***, 5.2, 5.3, **6*,** 10.1, **13*,** 17, **18***; up to **1090** m
5.	O. *nana* Noë	1, 3, 5.1, 5.2, 6, 7, 10, 15, 18, 19; up to 1100 m	1, 3, 5.1, 10.1, **13***, 15, **17***, 18, 19; up to **1350*** m
6.	O. *oxyloba* G.Beck	5.2, 6, 7, 9, 10, 15, 17.1, 17.2, 18, 19; 50 to 1000 m	**1.1***, 7, 10.1, **11***, **14.1***, **15***, 17.1, 17.2, 18, 19; 50 to **1200*** m
	var. *dalmatica* G. Beck	19	**18***, 19
	var. *macrantha* T. Georgiev	7, 10	7
7.	O. *ramosa* L.	1.2, 2, 3, 4, 5, 6, 7, 8, 10, 14.1, 15, 17, 18, 19 up to 1000 m	1, 2, 4, 6, 7, 10, **13***, 14.1, **14.2***, 15, 17, 18 up to **1200*** m
	var. *ramosa* f. *albiflora* G. Beck	4, 5.1, 7, 15, 18	4, 18
	var. *ramosa* f. *cyanea* G. Beck	1.2, 4, 7, 10, 15, 18	10, **14***, 15, 18
	var. *monoclonos* (Wallr.) G. Beck		**13*, 18***

2. ***Orobanche purpurea* Jacq.** (Fig. 2)

New data: **34TFM82** (10.1), Kresna - Mechkul, 180 m, 05.1905, SV(?), SOM 69760 (sub *O. arenaria*); **35TNH63** (5.3), Emine Mountain - Pomorie narrow, 10-15 km north from Slantchev Bryag, 200 m, with flowers, parasite on *Achillea nobilis* L., 17.06.2004, SC (KS), SOA s/n. The species is reported for the regions: 1.2 (Velenovsky 1891, 1898), 2 (Davidov 1904, 1905; Urumov 1905), 3 (Urumov 1917, 1935), 4 (Urumov 1897, 1898, 1904, 1905, 1917, 1935; Georgieff, 1937; Neichev 1908), 5.2 (Velenovsky 1898; Urumov 1897, 1901, 1901-a; Georgieff 1937; Neichev 1908), 7 (Urumov 1906 1935-a; Toshev 1902), 8 (Urumov 1930; Georgieff 1937), 10.2 (Urumov 1935-a), 15 (Urumov 1935-a), 16 (Toshev 1903), 17.1 (Stransky 1921; Georgieff 1937), 17.2, 17.3 (Velenovsky 1891, 1898; Georgieff 1937). It is indicated for the regions 5.1 (Velenovsky 1891; Urumov 1902, 1935, Georgieff 1937), 9 (Urumov 1904) and 18 (Velenovsky 1891, 1898; Georgieff 1937) without herbarium sheets. Our own collections confirmed the records from 5.1 and 18. This species is widely indicated as sporadically distributed in the territory of Bulgaria, up

Table 2: Host plants of *Orobanche* L. subgen. *Phelipanche* Novopokr. in Bulgaria (new data are preceded by an*).

#	taxon	indicated host plants	proved host plants
I.	**Sect. *Holoclada* Novopokr.**		
1.	*O. arenaria* Borkh.	*Asteraceae*: *Achillea*, *Artemisia*, *Anthemis* etc.; *Apiaceae*: *Eryngium maritimum* L.; *Lamiaceae*	*Asteraceae: Achillea millefolium*, *A. coarctata, A. pannonica**; *Lamiaceae Stachys recta*
2.	*O. purpurea* Jacq.	*Asteraceae: Achillea clypeolata, A. nobilis*, *Anthemis, Chrysanthemum, Artemisia, Pyrethrum*; *Polygonaceae: Polygonum*	*Asteraceae: Achillea clypeolata, A. millefolium, A. nobilis*
II.	**Sect. *Pleioclada* Novopokr.**		
3.	*O. aegyptiaca* Pers.	*Solanaceae: Nicotiana, Lycopersicon*	unknown
4.	*O. mutelii* F. W. Schultz	Solanaceae: *Nicotiana, Lycopersicon*; *Fabaceae: Vicia, Trifolium, Apiaceae*; *Lamiaceae*; *Asteraceae*	*Solanaceae: Nicotiana tabacum, Lycopersicon esculentum; Brassicaceae: Brassica oleracea*
5.	*O. nana* Noë	*Fabaceae: Trifolium, Vicia, Lotus; Brassicaceae: Lepidium, Capsela; Lamiaceae: Glechoma; Rubiaceae: Galium*	*Asteraceae: Mycelis muralis**; *Fabaceae: Medicago**; *Rubiaceae: Galium; Lamiaceae: Glechoma; Solanaceae: Nicotiana tabacum, Lycopersicon esculentum; Brassicaceae: Brassica oleracea*
6.	*O. oxyloba* G. Beck	*Asteraceae, Apiaceae*	unknown
7.	*O. ramosa* L.	*Cannabaceae: Cannabis, Humulus; Urticaceae: Urtica; Solanaceae: Nicotiana, Solanum; Lamiaceae; Asteraceae*	*Cannabaceae: Cannabis sativa; Solanaceae: Nicotiana tabacum, Lycopersicon esculentum*

to 1000 m (FB1; FB4; FRB; CBVF; KPB). Herbarium specimens or floristic records from the regions 1.1, 11, 12, 13, 14, 19 and 20 were not found. The existing data show that the distribution area of this species should be: 1.2, 2, 3, 4, 5, 7, 8, 10.1, 15, 16, 17, 18 (Table 1). The upper vertical border of this species is 1300 m.

var. *hirsuta* G. Beck

This variety is reported for 5.2 (FRB), 8 (Georgieff 1937; FB4; FRB), 17.1 (Georgieff, 1937) and 17.2 (FB4; FRB). The subregion 17.1 is not reported in FRB.

var. *rhodopaea* T. Georg.

34TGM45 (17.1). in collis siccis, mt. Rhodope occidentalis, Čepino, 750 m.s.m.

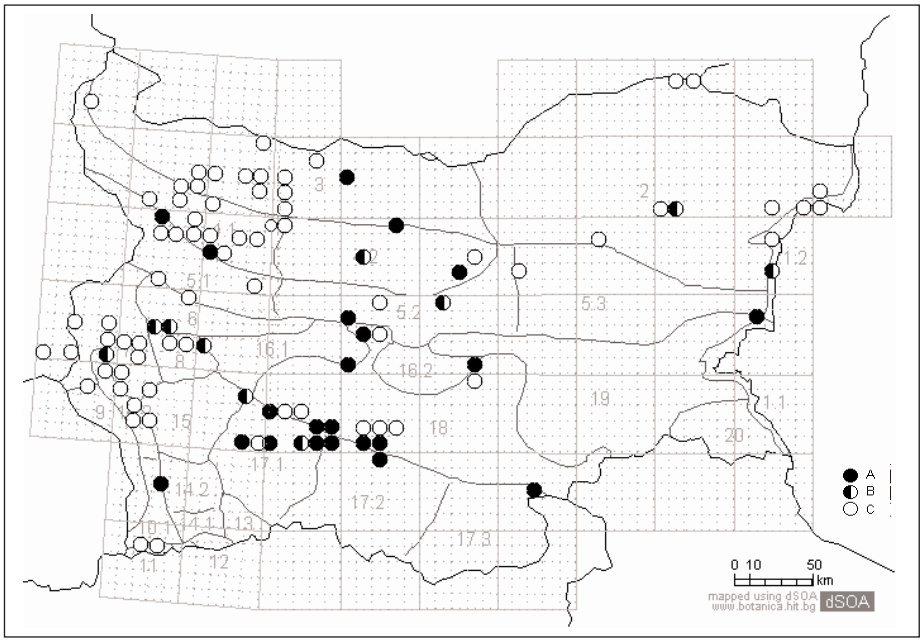

Fig. 2. *Orobanche purpurea* Jacq.: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

24.06.1926, SV(Davidov/Georgieff) , SOA 56078 (lectotypus). In FB4 and FRB this taxon is accepted as a sinonym of var. *purpurea* which is distributed in the area of the species.

The host plants, according to the herbarium data (Table 2), are *Achillea* (*A. clypeolata* Sm., *A. millefolium* L. and *A. nobilis* L.) only (FB1; Georgieff 1937; FB4; FRB; KPB). The literature data indicates host plants like *Anthemis* (FB1; FB4, FRB), *Chrysanthemum* (FB4), *Artemisia* (FB1; Georgieff 1937; FRB; KPB), *Pyrethrum* (FB1) and *Polygonum aviculare* L. (Georgieff 1937; FRB).

II. Sect. *Pleioclada* Novopokr.

3. ***Orobanche aegyptiaca*** **Pers.** (Fig. 3)

The specimens signed as *O. aegyptiaca* in the herbarium sheets are compared with the exsiccae of Novopokrovsky (issues of LE) - respectively from Kazakhstan (SOM 745832) and from Russia (SOM 69631). According to specimens signed as "*Phelipaea longiflora* C.A.M., in collis siccis circa Varnam, 16.06.1900" (Det. Davidoff; SOM 69672, 69673, 69668), this species is incorrectly reported for region 1.2 (Velenovsky 1898; Davidov 1905), however it is not mentioned for this region in the later publications. The specimens above are revised later as *O. arenaria* Borkh. The information about the other regions is based on herbarium sheets incorrectly determined as *O. aegyptiaca* Pers.: SOA 10407 from Chepelare (17.2) with an unknown host plant (collected by Urumov) and two specimens

from Kardjali (17.3) - SOA 10404 sub *O. muteli* F. W. Schultz (Det. Stefanov) and SOA 10405 sub *O. purpurea* Jacq. (Det. Nikolov). All of the three exsiccatae are correctly revised as O. mutelii Schultz. by Delipavlov. On the above grounds, this species may be incorrectly given for the subregions 17.2 and 17.3 (Georgieff 1937; FB4; KVPB; FRB; CVFB; KPB). Probably for that reason, *O. aegyptiaca* is considered as a parasite on tobacco and tomatoes in Bulgaria (Georgieff 1937; FB4; KVPB, FRB). One sample without a host plant (SOA 10406) from Krupnik (10.1), collected by N. Stoianov and determined later as *O. aegyptiaca* Pers. by an unknown author is factually *O. oxyloba* (Reut.) G. Beck. For that reason *O. aegyptiaca* has been incorrectly cited for the Struma valley (10) (FRB). The floristic records indicate one habitat from 5.3 (Velenovsky 1891; FB1; Georgieff 1937; FB3; FB4; FRB; KPB) on the ground of a lost specimen from Sliven, collected by Škorpil (Velenovsky 1891). This species is also indicated for the Tundja plain (19) (FRB) without herbarium data or literature records. As presented given above *O. aegyptiaca* is not confirmed with herbarium sheets and should to be excluded from the flora of Bulgaria.

4. ***Orobanche mutelii* F. W. Schultz** (Fig. 4)

New and unpublished data: **34TFN93** (6), parasite on cabbage, lawns near Sofia. 3.09.1945, SV(Stefanov), SOA s/n; **34TGM20** (13), Gotze Delchev, on the coast of T

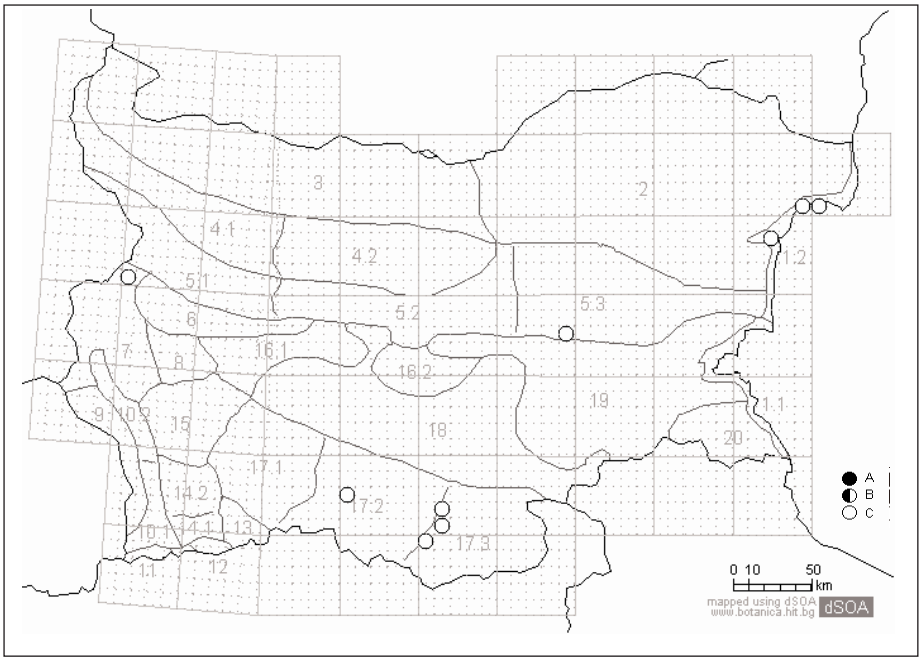

Fig. 3. *Orobanche aegyptiaca* Pers.: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

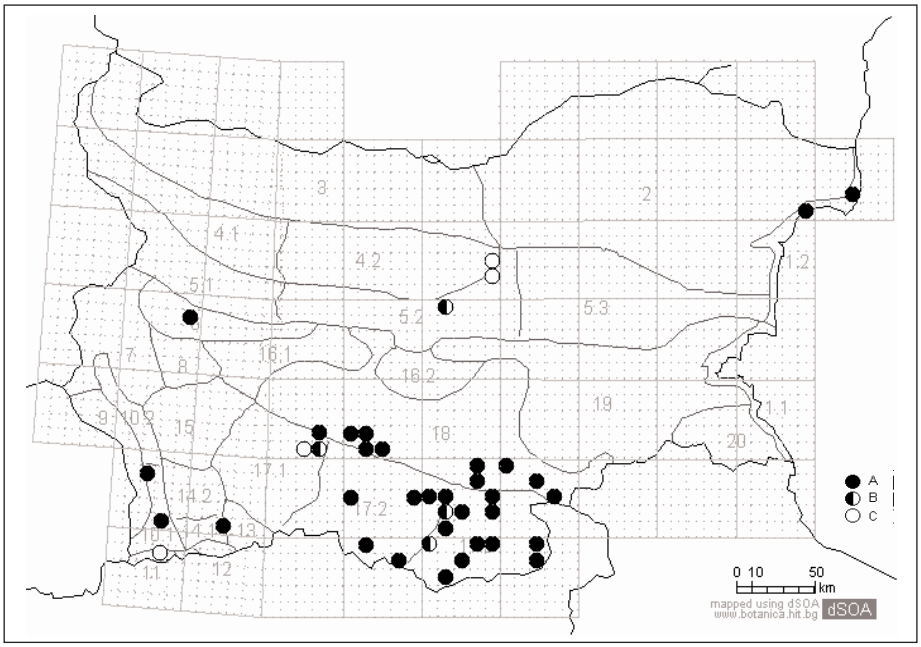

Fig. 4. *Orobanche mutelii* Schultz: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

Tupuvashka-River, 540 m, with flowers, parasite on tobacco, 27.09.2003, SC(KS), SOA 56555; **35TLG06** (18), on the way between the villages Parvenetz and Markovo, uncultivated land, 300 m, with flowers, among *Xanthium spinosum*, 4.10.2002, SC(KS), SOA 56548; **35TLG15** (18). Markovo - Institute of Tobacco, 3.09.1993, 23.09.1993, SV(Cheschmedzhiev), SOA 47713, 47695 - 47701, 10.06.1981, SV(P.Mitov), SOA 39602; Kuklen - under the village, in tomato field, 300 m, parasite on tomatoes, with flowers, 22.09.2003, SC(KS), SOA 56551; **35TLG16** (18), in the campus of The Agricultural University, 160 m, with flowers, parasite on tomatoes, 26.06.2002, SC(KS), SOA 56550; **35TLG25** (18), Dolni Voden, Asenovgrad, in tobacco fields, 280 m, 18.08.1993, SV(Cheschmedzhiev), SOA 47706; between Asenovgrad and Dolni Voden, parasite on tomatoes, with flowers, 23.09.2003, SC(KS); **35TLG83** (18) Haskovo - "Karamahmutlii" in tobacco field west of the Oak forest, 21.07.1978, SV(P.Rohov), SOM 139455 (sub *O.ramosa*); **35TLG84** (18): parasite on cohlrabi in the gardens near Haskovo, 20.10.1988, SV(Delipavlov), SOA 47951; **35TMG04** (18) Harmanli, in tobacco field, 80 m, 21.10.1968, SV(Vihodcevsky), SO 68534 (sub *Orobanche ramosa* f. *polyclonos* (Wallr.) Beck); **35TMG32** (18): Svilengrad, parasite on cabbage, 55 m, 4.10.2003, SC(KS & A.Chakarova), SOA s/n; **35TNJ90** (1.2), Balchik - Tuzlata, 15 m., 06.1976, SV (S. Kozuharov), SOM 132041 (sub *O. cumana*); **35TPJ21** (1.2): St. Nikola - Dobrich region, 14.06.1997, SV(?) SOA 48105. The species is reported for 5.2, 5.3 (Urumov 1898; FB1; FB3; Georgieff 1937; FB4; KVPB; CVFB; KPB), 10 (KVPB; CVFB; KPB), 17

(FB4; KVPB; CVFB; KPB) - 17.1 (Georgieff 1937) and 17.3 (Georgieff 1937; Hermann & al. 1929) up to 1000 m. The species is indicated for the regions 4.2 (Velenovsky 1891) and 11 (FB3; FB4), however not confirmed with herbarium specimens. The species is noted for the whole country in FRB, althought neither herbarium materials nor floristic records for all 10 regions and 4 subregions (1.1, 3, 4.1, 5.1, 7, 8, 9, 10.2, 12, 14, 15, 16, 19, 20) are shown. Our own collections and revised distribution data covers the regions 1.2, 5.2, 5.3, 6, 10.1, 13, 17, 18 (Table 1) and vertical distribution between 10 and 1090 m.

The confirmed host plants of *O. mutelii* in Bulgaria are cultivated species only: *Nicotiana tabacum*, *Lycopersicon esculentum* and *Brassica oleracea*. The indicated host plants *Vicia*, *Trifolium* (FRB), *Apiaceae* (FRB; KPB), *Fabaceae*, *Lamiaceae* (KVPB), *Asteraceae* (KVPB; KPB) and *Humulus* (Velenovsky 1891) are not confirmed with literature data or herbarium specimens (Table 2).

5. ***Orobanche nana*** **Noë** (Fig.5)

New and unpublished data: **34TGM20** (13): Gotze Delchev, on the coast of Tupuvashka-river, 540 m, with flowers, parasite on tobacco, 27.09.2003, SC (KS), SOA 56544; **35TKG85** (17.1): Kozarsko, near Plovdiv, 27.08.1986, SV(M. Popova), SOA 44736 (sub *O. arenaria*); **35TLG15** (17.2): on herbaceous places over Markovo, near Plovdiv, 15.06.1988, SV (Delipavlov), SOA 47952; **35TLG24** (17.2): Bachkovo Monastery, 400 m, with flowers, 7.09.2003, SC (KS & Tz. Raycheva), SOA 56543; **35TLG24** (17.2): over the hut Martziganitza, direction to the Bachkovo path, 1350 m, parasite on *Mycelis muralis* (L.) Dumort., 16.08.2003, SC (KS), SOA 56542; **35TLG25** (17.2): "Asenova krepost", on citadel wall, 350 m, with flowers, 1.06.2003, SC(KS & Tz. Raycheva), SOA s/n; **35TMF29** (17.3): on herbaceous places over Ivaylovgrad, 160 m, 13.05.1995, SV (Delipavlov), SOA 49695. The species is known for the regions 1 (FRB), 3 (CVFB; KPB), 5.1 (Georgieff 1937; FB4; FRB), 10 (FRB), 15 (Georgieff 1937; FB3; FB4; CVFB; KPB), 18 (Georgieff 1937; FB4; KVPB; CVFB; KPB), 19 (KVPB; FRB), up to 1100 m. Floristic records exist in the literature for region 7 (FB3; FRB) as well as 5.2 (CVFB; KPB), 6 (KVPB; FRB; CVFB; KPB) but not confirmed by herbarium sheets or floristic records. The revised specimens and our own collections confirm the literature data for the regions 1, 3, 5.1, 10.1, 13, 15, 17, 18, 19 (Table 1) and vertical distribution up to 1350 m.

The known host plants of *O. nana* in Bulgaria are *Galium*, *Glechoma*, *Nicotiana tabacum*, *Lycopersicon esculentum* and *Brassica oleracea*. New data about *Mycelis muralis* (L.) Dumort. and *Medicago* sp. should be added to the known host plants. FRB and KPB contain unconfirmed data about host plants as *Trifolium*, *Vicia*, *Lotus*, *Lepidium*, *Capsella*, etc.

6. ***Orobanche oxyloba*** **G. Beck** (Fig.6)

New and unpublished data: **35TNG67** (1.1): on herbaceous places near Primorsko, 15 m, 10.05.1968, SV (Delipavlov), SOA 24495 (sub *O. purpurea*); **34TFL78** (11):

Samuilovo, 300 m, 25.05.2004, SC (O. Todorov & KS), SOA s/n.; **34TGL29** (14.1): on chalky slope of peak St. Elena, 1200 m, SV(M. Nikolova) SO 98078 (sub *O. ramosa*); **34TGM38** (15): near the village Gabrovetz, 600 m, SV (St. Georgieff) SO 68536 (sub *O. ramosa*). Floristic records are found from the regions 7 (Georgieff 1937; FB4; KVPB; FRB; CVFB; KPB), 10 (FB4; KVPB; FRB; KPB) - 10.1 (Georgieff 1937), 17.1 (FRB), 17.2 (Velenovsky 1898; FB1; Georgieff 1937; FRB), 18 (KVPB; CVFB; KPB), 19 (Georgieff 1937; FB4; KVPB; FRB; CVFB; KPB), at altitudes from 50 to 1000 m. (FRB; KPB). The species is indicated for the regions 6 (FRB) and 9 (CVPB), however, neither herbarium specimens or literary floristic data exist. The revised data covers the regions 1.1, 7, 10.1, 11, 14.1, 15, 17.1, 17.2, 18, 19 (Table 1) and vertical distribution up to 1200 m.

var. *dalmatica* G. Beck

The existing herbarium specimens are from the regions 18 and 19. The only floristic

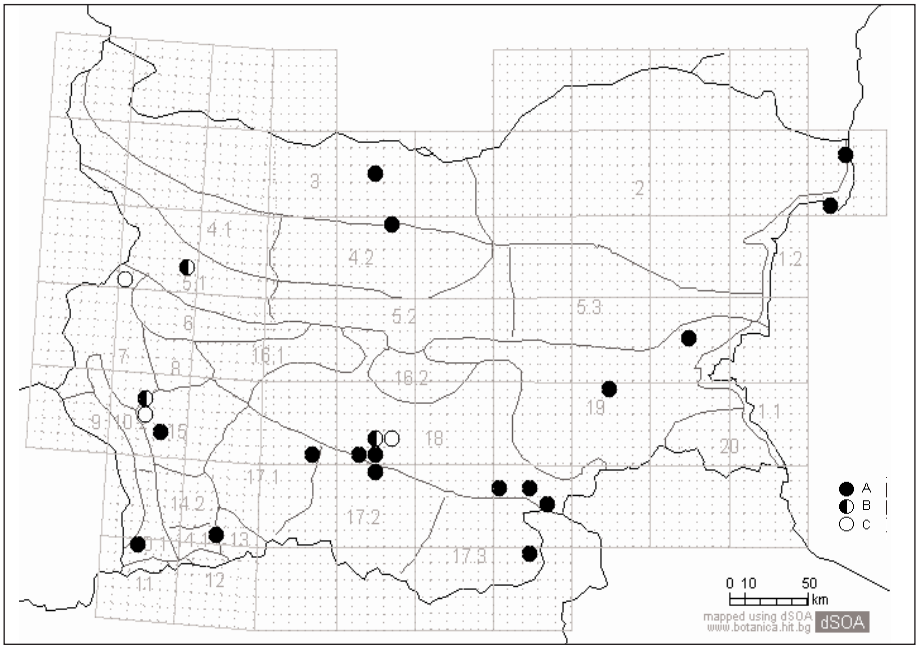

Fig. 5. *Orobanche nana* Noë: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

record is from 19 (Georgieff 1937; FB3). The variety is indicated in FRB as distributed in the area of the species.

var. *macrantha* T. Georg.

34TFN55 (7): m. Čepan ad Dragoman, 29.06.1930, SV(Georgieff), SOA 18535 (lectotypus). Georgieff (1937) reported this variety for the Znepole region (7). It is indicated for the Struma valley (10.1) (Georgieff 1937) and "Western and Southern Bulgaria" (FB3). In

FB4 and FRB this variety is accepted as a synonym of var. *oxyloba* which is distributed in the area of the species.

The existing herbarium specimens and literary floristic records are not acompanied by information about the host plants. The literature data indicates host plants in the *Asteraceae* (FB1; FB3; FB4; KVPB) and *Apiaceae* (FRB, KPB).

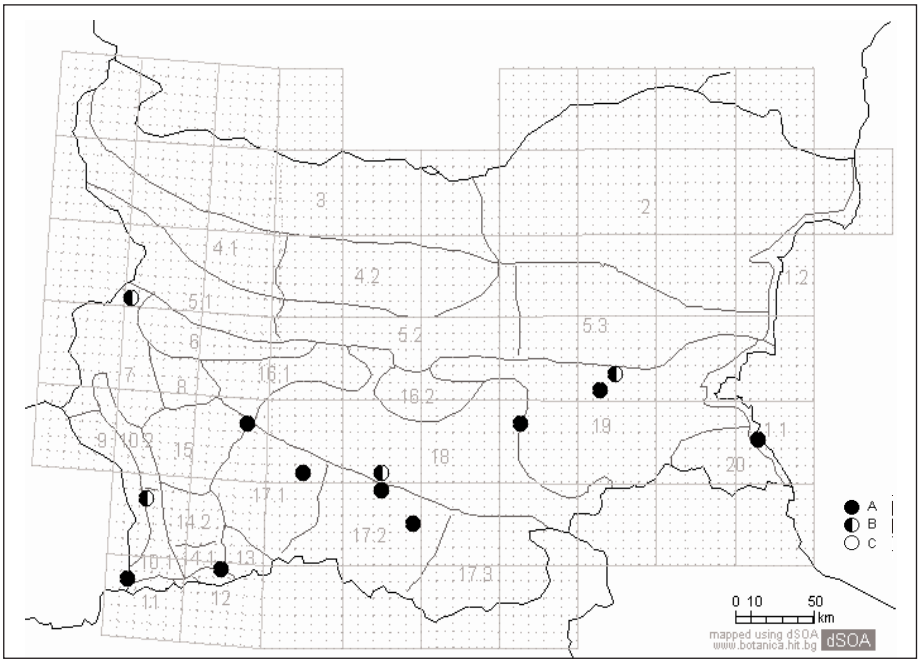

Fig. 6. *Orobanche oxyloba* G.Beck: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

7. ***Orobanche ramosa* L.** (Fig.7)

New data: **35TNG67** (1.1), on sandy places ner the coast, Kiten, 15 m, SV(Cheschmedzhiev), SOA 18611; **34TGM20** (13): Gotze Delchev, on the coast of Tupuvashka-river, parasite on tobacco, 540 m, 27.09.2003, SC (KS), SOA 56531, 56529; **34TGM04** (14.2): Between Razlog and Bansko, parasite on tobacco, with flowers, 31.08.2004, SC (KS), SOA s/n; **34TGM13** (14.2) Between Bansko and Dobrinishte, parasite on tobacco, with flowers, 1.09.2004, SC(KS), SOA s/n; **34TGM13** (14.2), near Dobrinishte, 840 m, in tobacco field, with flowers, 1.09.2004, SC(KS), SOA s/n. The species is reported for the regions 1.2 (Velenovsky 1891; TG. 1937), 2 (Davidov 1904, 1905, 1909; Urumov 1901), 4 (Urumov 1901, 1905, 1909, 1928, 1935; Yavashov 1890; Georgieff 1937), 6 (Velenovsky 1891; Urumov 1905), 7 (Urumov 1904, 1913, 1935-a; FB3; Georgieff 1937), 10 (Urumov 1913, 1935-a), 14.1, 15 (Georgieff 1891, 1906; Yavashov 1890; FB3, Urumov 1908, 1935-a), 17.1 (Yavashov 1890; Urumov 1917), 17.2

(Urumov 1908), 17.3 (Georgieff 1937), 18 (Velenovsky 1891; FB3; Urumov 1908, 1929-a; Georgieff 1937), 19 (Georgieff 1937). It is indicated for the regions 3 (Urumov 1935), 5.1 (Yavashov 1890; Urumov 1905, 1935; Georgieff 1937), 5.2 (Urumov 1929-a), 5.3 (Urumov 1909) and 8 (Urumov 1929, 1935-a). The Floras and keys (FB1; FB4; KVFB; FRB; CVFB; KPB) indicate *O. ramosa* for the whole country. However, it should be pointed that no data occur for the regions 9, 11, 12, 16, 20. The confirmed chorological data covers the regions 1, 2, 4, 5.1, 6, 7, 10, 13, 14, 15, 17, 18 (Table 1) and vertical distribution up to 1200 m.

var. *ramosa*

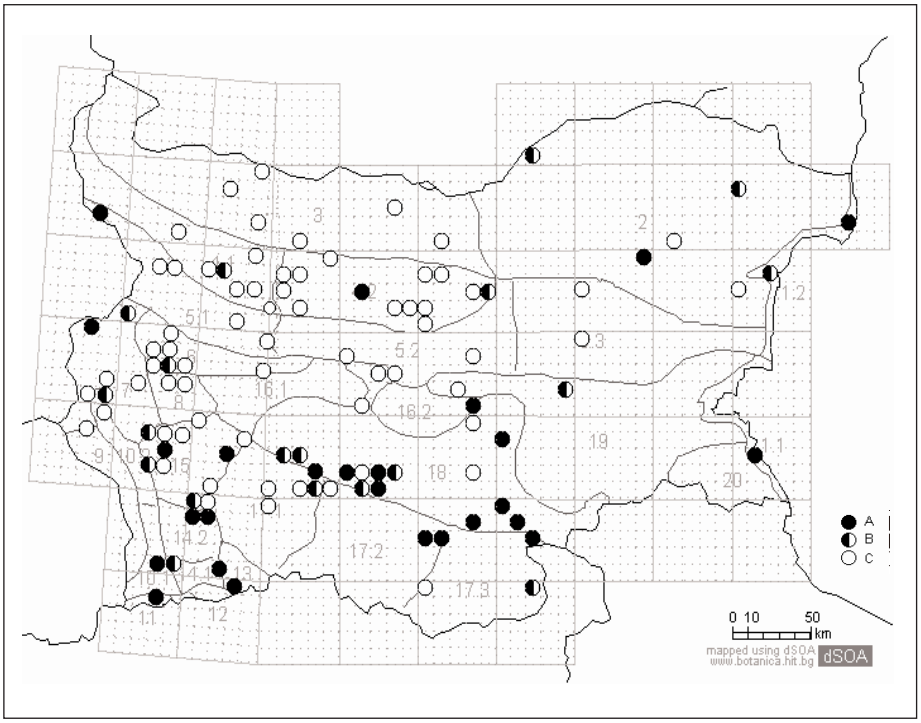

Fig. 7. *Orobanche ramosa* L.: **A**. data from herbaria; **B**. data from the literature and herbaria, and **C**. data from the literature.

f. *albiflora* G. Beck

This form is reported for 4 (Georgieff 1937) and 18 (FB3) and also is indicated for 5.1 (Georgieff 1937), 7 (FB3; Georgieff 1937), 15 (FB3). FB4 and FRB indicate it as distributed in the area of the species.

f. *cyanea* G. Beck

New data: **34TGM20** (14.1): Beside the way in west of "Popovi livadi", with flowers, 18.06.2005, SC(KS), SOA s/n; **34TGM04** (14.2): Between Razlog and Bansko, parasite on tobacco, with flowers, 31.08.2004, SC(KS), SOA s/n; **34TGM13** (14.2): Between Bansko and Dobrinishte, parasite on tobacco, with flowers, 1.09.2004, SC(KS), SOA s/n. The form is known for 10 (Georgieff 1937; FRB), 15, 18 (Georgieff 1937). It is indicated for 1.2 and 4 (Georgieff 1937) without herbarium sheets, as well 7 (FRB) without floristic records.

var. *monoclonos* (Wallr.) Delip.

New data: **35TNG67** (1.1): on coastal sandy places near Kiten, Burgas region, 27.05.1963, SV(Cheshmedzhiev), SOA 18611; **34TGM20** (13): Gotze Delchev, on the coast of Tupuvashka-river, 540 m, parasite on tobacco, with flowers, 27.09.2003, SC(KS), SOA 56531; **35TLG06** (18): on the way Parvenetz-Markovo, uncultivated land, 300 m, with flowers, 4.10.2002, SC(KS), SOA 56530; However, it is not reported in the floristic literature, but this variety is indicated in FB4 and FRB as distributed in the species area.

According to the literature data, *O. ramosa* parasitises *Cannabis* (Velenovsky 1891; FB1; FB4; FRB), *Urtica*, *Humulus* (Velenovsky 1891), *Nicotiana*, *Solanum*, *Lamiaceae*, *Asteraceae*, etc. (FB1; FB4; FRB). The existing specimens are supported with data about the host plants *Cannabis*, *Lycopersicon* and *Nicotiana* (Table 2).

This section contains also the Mediterranean species *O. lavandulacea* Rchb. known in the southern and western parts of the Balkan peninsula (Chater & Webb 1978). According to Schuschardt *et al*. (1998) one hybrid is reported between *O. lavandulacea* and *O. ramosa*, observed in the tobacco fields of Bulgaria. This result came from an analysis of polyphenol molecular markers of the species *O. mutelii* and *O. ramosa* (Georguieva & Edreva 1994). There are no herbarium specimens deposited under this name (Nedelcheva 2003).

Conclusion

Orobanche aegyptiaca Pers. have to be excluded from the flora of Bulgaria. There are no herbarium sheets of this species. On the basis of inexact chorological data, this species is wrongly reported as a parasite on tobacco and tomatoes in Bulgaria.

The information on *O. purpurea* Jacq., *O. mutelii* Schultz and *O. ramosa* L. have to be reconsidered. Altought they are found to be distributed throughout the whole country according to Floras and keys, some regions lack records or herbarium sheets. The new data here adds five regions to the distribution area of *O. mutelii* and two regions to the distribution area of *O. ramosa*. New data is presented in this study presented that the distribution area of *O. nana* Noë is wider than described in the Floras and at higher altitudes than the reported before. *Mycelis muralis* (L.) Dumort. is reported as a new host plant of this species. Four regions should be added to the distribution area of *O. oxyloba* G. Beck.

The review of existing herbarium data about host plants of genus *Orobanche* subgen. *Phelipanche* (Pomel) Tzvel. in Bulgaria presents that occasionally the information is not sufficient. It should be pointed that not all of the reported cases are confirmed by herbarium sheets. A large part of the specimens are not supported by information for host plant. In other cases, the information on the specimen label does not confirm the host plant. Very often, the specimens with host plants mounted on the same sheet do have not physical con-

nections. Probably most of data about host plants are based on the plants are based on the plants found in neighbourhood to the parasite. For that reason, contradictory data about the host/parasite relationships has come about.

Aknowledgements

The author thanks to Prof. Stephan Stanev (Natural Science Museum – Plovdiv) and Prof. Iliya Cheshmedzhiev (Agricultural University - Plovdiv) for the valued advices about the presented article.

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