

# Natural hybrids of *Rumex* subgenus *Rumex* (*Polygonaceae*) in Bulgaria

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**Abstract.** On the basis of the available literature, herbarium specimens and personal accessions, the information about the distribution of the known natural hybrids of *Rumex* subg. *Rumex* in the country (*R. obtusifolius* × *R. patientia*, *R. palustris* × *R. stenophyllus*, *R. conglomeratus* × *R. sanguineus* and *R. crispus* × *R. patientia*) was updated. The present study confirmed the distribution of *R. crispus* × *R. obtusifolius* for the flora of Bulgaria. New natural hybrids *R. conglomeratus* × *R. crispus*, *R. confertus* × *R. obtusifolius*, *R. cristatus* × *R. obtusifolius*, *R. palustris* × *R. obtusifolius* and *R. patientia* × *R. pulcher* were established for the first time in Bulgaria and their localities were reported. The aim of this study was to review the known chorological data about natural hybrids of *R. subg. Rumex* in Bulgaria.

**Key words:** chorology, maps, natural hybrids, *Rumex* subgenus *Rumex*

## Introduction

In the recent classification, the genus *Rumex* L., which contains about 250 species, is subdivided into three subgenera. The largest subgenus *Rumex* includes about 150 species (Datta 1952), among which are some of the most widely spread plants all around the world (Rechinger 1949). The natural hybridization in *R. subg. Rumex* is a process revealed in high frequency in this group of vascular plants. This is confirmed by the fact that, in historical aspect, the description of new hybrid combinations is a process, continuing till now. Practically, all possible hybrid combinations of the taxa in the subgenus have been described. A great part of the hybrids are described using herbarium materials (very often single sheets). In theoretical aspect, the recognition of hybrid forms has a significant importance for the differentiation of the taxa, due to the fact that *Rumex* hybrids are very often regarded as species by some authors (Rechinger 1932).

The natural hybridization in *R. subg. Rumex* in the Bulgarian flora has not been purposefully researched so far. The data about the distribution of natural hybrids on the territory of Bulgaria is outdated and incomplete. The first hybrids for the country were reported by Urumov (1901), Širjaev (1922), Stojanov & Stefanov (1924), Stojanoff (1932), Rechinger (1933), and later on

by Anchev (1984). In most cases, the data about the interspecific hybrids are rather generalized and incomplete – separated localities were reported more than 50 years ago, and never confirmed afterwards or there were no herbarium materials of Bulgarian origin deposited. Some of the hybrids were discovered in the last few decades (Panov 1987). The hybrids of *R. subg. Rumex*, described and specified for the Bulgarian flora, have not provided a sufficiently complete idea about the amount and spreading of the natural hybrids in the country. The lack of systematic researches in the group is slowing down the knowledge about *R. subg. Rumex* and particularly about its hybrids in Bulgaria. Perhaps due to this reason natural hybrids are often identified and deposited as species in the Bulgarian herbaria.

The present study was based on literature data, herbarium samples and field studies and its purpose was to update and present the available information regarding the spreading of some natural hybrids of *R. subg. Rumex* in Bulgaria.

## Material and methods

The new material used in this study was collected in 2003–2005 from natural habitats in the country. The collections were based on the transect method. The samples of the hybrid forms were deposited in herbari-

um SOA. The collections from SOM, SOA and SO were revised. For some critical taxa with no existing herbarium specimens in the national herbaria, voucher specimens from the herbaria of Vienna University (WU) and Vienna Natural History Museum (W) were used for comparison. The chorological information has been mapped in a relational data base by the software program "dSOA" (Stoyanov 2003). The data were presented according to Kozuharov & al. (1983). The maps were divided in the floristic regions and subregions as accepted in the multivolume edition *Flora Reipublicae Popularis Bulgaricae*.

## Results and discussion

The hybrid samples deposited at the Bulgarian herbaria are limited in number, in most cases individual samples. Too often the hybrid forms have been deposited as species and their hybrid appurtenance was determined as a result of revisions. Five of the known hybrid combinations were not confirmed with herbarium materials.

### *Rumex obtusifolius* L. × *R. patientia* L. (Fig. 1)

Panov (1987) provided data for this hybrid for the region of Sofia. The information is supported by a hybrid sample: Sofia region – residential area Geo Milev, 550 m alt., 28.08.1986, FN-83 (coll. Panov), SOM 146058.

Comparative samples: SO 17602 (Austria inferior, Rechinger, 1892); W 05670 (Chiswick, Middlesex, J. Lousley, 1942); WU 853 (Bulgaria, Klisura, Velenovský, 1887).

New data: Northeast Bulgaria – in the village Mechka, district of Rousse, 40 m alt., 16.08.2005, MJ-25 (TzR), SOA 56953; Danubian plane – 5–6 km south of Pleven,

116 m alt., 25.06.2004, LJ-00 (TzR), SOA 56977; West Frontier Mts – after the village Kamenichka Skakavitsa along the road to Gueshevo, uncultivated land and pastures, 1402 m alt., 19.06.2005, FM-27 (TzR), SOA 56945; Belasitsa Mt – between the villages Klyuch and Scrut, 300 m alt., 19.06.2005, FL-68 (TzR), SOA 56951; Rila Mts – after the village of Saparevo, along the road under a pine forest, 760 m alt., 19.06.2005, FM-98 (TzR), SOA 56952; Sredna Gora Mts (West) – over the town of Klisura, along Stryama river in the Kosharite locality, 740 m alt., 03.07.2005, KH-92 (TzR), SOA 56953; Rhodopes Mts (Central) – along the road between Narechenski Bani and Hvoyna village, 680 m alt., 12.06.2005, LG-03 (TzR), SOA 56961; after the village Chokmanovo towards Arda river, 973 m alt., 22.07.2005, LG-10 (TzR), SOA 56946; Rhodopes Mts (East) – ruderal places to the village of Mandritsa, 100 m alt., 15.07.2005, MF-28 (TzR), SOA 56947; Thracian Lowland – along Klokotnitsa river in the village Klokotnitsa, 135 m alt., 04.07.2004, LG-74 (TzR), SOA 56974.

This hybrid combination is widely spread in Macedonia, Bosna, Croatia (Rechinger 1943).

### *Rumex crispus* L. × *R. patientia* L. (Fig. 2)

Stojanoff (1932) provided data about the spreading of the hybrid in the country for the Thracian Lowland on the basis of one herbarium sample, initially determined by Stříbrný as *R. obtusifolius* and later revised by Rechinger, belonging to the hybrid combination – Thracian Lowland: Ad Papazli, bei Philipopolis, 140 m alt., 04.05.1915, LG-46 (Rechinger), SOM 17837.

Comparative samples: SO 17607 (Austria inferior, Rechinger); SOA 5768 (Austriae inferior, Rechinger, 1930); WU 2636 (Austriae inferioris, Teyber, 1911);

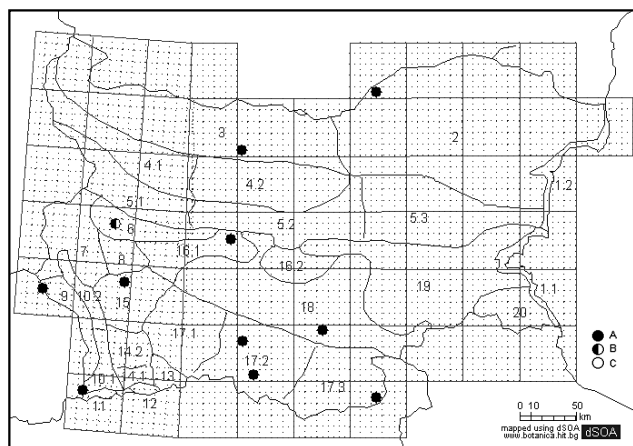


Fig. 1. Distribution map of *R. obtusifolius* × *R. patientia*: A – new data; B – herbarium specimens; C – literature data.

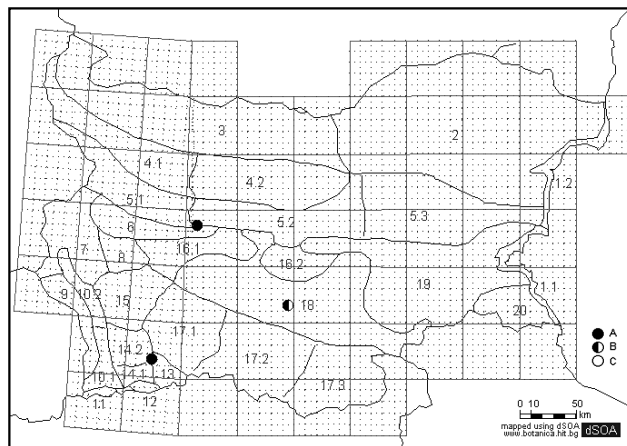


Fig. 2. Distribution map of *R. crispus* × *R. patientia*: A – new data; B – herbarium specimens; C – literature data.

WU 2438 (Austriae, Rechinger, 1890); W 1965–7592 (Banatus, 1914, Prodan).

New data: Stara planina Mts (Central) – ruderal places around village Zlatitsa, 696 m alt., 03.07.2005, KH-63 (TzR), SOA 56973; Valley of Mesta River – the village Gospodintsi, ruderal places, 560 m alt., 17.06.2005, GM-21 (TzR), SOA 56980.

***Rumex palustris* Sm. × *R. stenophyllus* Ledeb.**  
(Fig. 3)

Stojanoff (1932) provided the only literature record about this hybrid in Bulgaria for the mouth of Kamchia river. The information has been confirmed by a single herbarium sample, initially determined by Davidov as *R. pulcher*, later revised by Rechinger as *R. palustris* × *R. stenophyllus*, belonging to the hybrid combination – Black Sea Coast (North): Kamchia, 0 m alt., 02.08.1898, NH-76 (coll. Davidov), SOM 17849.

Comparative samples: W 01243 (Oesterreich Wien, 220–230 m, T. Barta, 2000); W 15360 (Hungaria orientalis, Rechinger, 1894); W 1966–85 (Austria, Melzer, 1964); W 1973–28948 (Austria, Rechinger, 1923); SOM 17796 (Hungaria: prope pag. Galos, Rechinger); SO 17537 (Hungaria orientales, V. Borbás) sub *R. limosus* × *odontocarpus*.

New data: Northeast Bulgaria – along Danube River at Rousse town, together with the parent forms, 29 m alt., 16.08.2005, MJ-15 (TzR), SOA 56957; Danubian plane – along the Danube coast at the village Archar, 20 m alt., 06.09.2004, FP-75 (TzR), SOA 56972.

***Rumex crispus* L. × *R. obtusifolius* L. s.l.** (Fig. 4)

This hybrid combination is regarded as one of the most widely spread in Europe. The polymorphism established in it has been marked by many authors (Rechinger 1932; Klimeš 1993) and is due to the variability in the group of *R. obtusifolius*, which, according to the authors, is organized in 4 subspecies or varieties, showing great diversity.

Literature data showed that the hybrid is distributed in the middle part of Stara Planina Mts over the

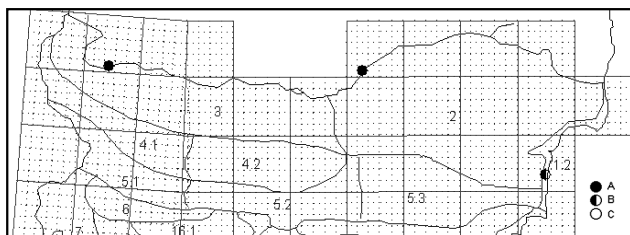


Fig. 3. Distribution map of *R. palustris* × *R. stenophyllus*: A – new data; B – herbarium specimens; C – literature data.

town Klisura (Velenovský 1891; Stojanov & Stefanov 1924) and the village of Hainito (Urumov 1901) under the name *R. pratensis* Mert. & W.D.J. Koch (= *R. crispus* × *R. obtusifolius*), without specifying its hybrid apurtenance. Later on, it was reported for the Rhodopes Mts (without specifying a definite locality) by Stojanov & Stefanov (1924), but there are no samples deposited in the Bulgarian herbaria under this name. As a result of revisions, four samples of Bulgarian origin, belonging to the hybrid combination, were determined: Sofia region – grassy places in the green areas along the "G. Traykov" blvd., close to Perlovska river, 550 m alt., 29.09.1986, FN-83 (coll. Panov), SOM 146059, sub *R. crispus* × *stenophyllus*; Vitosha Mt – over the village Bosnyak, 1073 m alt., 26.06.2005, FN-70 (coll. D. Dimitrov), SOM 161970, sub *R. stenophyllus*; Belasitsa Mt – in meadow at the village Samuilovo, Petrich region, 300 m alt., 19.05.1951, FL-78 (coll. N. Stojanov, B. Achtarov), SOM 92069, sub *R. sanguineus*; Pirin Mts (South) – 1970 m alt., GL-29, 08.1989 (coll. D. Stoyanov), SO 149811, sub *R. obtusifolius* ssp. *transiens*.

Comparative samples: SOA 5682 (Suecica, Lagerkranz, 1915); SOA 5762 *R. crispus* × *silvestris* (Austria inferior, Rechinger, 1927); SOM 113050, 113052 (Thuringia: Schlusingen, Haussknecht, 1883, 1889); SOM 109223 (Goeteborg, ad Gulbergsan, Ohlsen, 1928); SOM 109224 (Suecicae, Hasslow, 1934); SOM 141920 (Finland, Er. Reinikka, 1976); WU 2636 (Austria, Rechinger, 1905); s.n. (Wien, Rechinger, 1891); W 1993–01251 sub *R. crispus* (Caucasus, V. Vašák, 1975); W 2006–14353 sub *R. crispus* (Armenia, Ogenesian, 2006).

New data: Danubian plane – Pleven, grassy places to the North, outside the town, 100 m alt., 25.06.2003, LJ-01 (TzR), SOA 56975; Stara planina Mts (Central) – in the village Tsarkvishte, 780 m alt., 03.07.2005, KH-

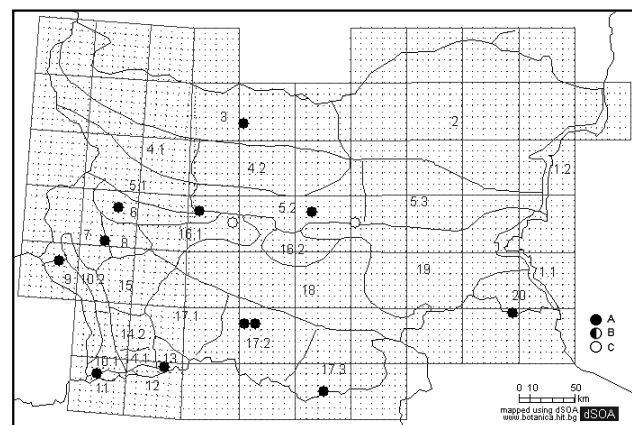


Fig. 4. Distribution map of *R. crispus* × *R. obtusifolius*: A – new data; B – herbarium specimens; C – literature data.

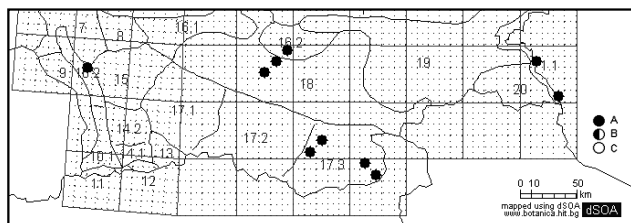
63 (TzR), SOA 56965; the Shipchenski pass, together with the parent forms, 1185 m alt., 16.08.2005, LH-63 (TzR), SOA 56982; West Frontier Mts – along the road at the village Vratsata, Kyustendil region, 799 m alt., 19.06.2005, FM-38 (TzR), SOA 56966; Valley of Mesta River – along the road from the village of Sadovo to Ilinden, 793 m alt., 17.06.2005, GL-39 (TzR), SOA 56944; Rhodopes Mts (Central) – in the village Yugovo, damp places, 680 m alt., 17.07.2004, LG-13 (TzR), SOA 56948; along the paths in the village Hvoyna, 680 m alt., 22.07.2005, LG-03 (TzR), SOA 56949; Rhodopes Mts (East) – uncultivated land in the village of Tihomir, 519 m alt., 14.07.2005, LF-77 (TzR), SOA 56960; Strandzha Mt – along Churka river after the village Brashlyan, 348 m alt., 04.07.2004, NG-44 (TzR), SOA 56968.

#### ***Rumex conglomeratus* Murray × *R. crispus* L. (Fig. 5)**

This hybrid combination has not been reported in the literature nor deposited as herbarium samples of Bulgarian origin.

Comparative samples: SOA 5763 (Austria, Rechinger, 1927); WU 00430 (Iter Chilense, Rechinger, 1987); W 6326 (Iter Graecum: Epirus, 1200–1400 m, Rechinger, 1956); W 1949–10778 (Burgenland, Rechinger, 1924); W 1979–13090 (Macedonia, Rechinger, 1972).

New data: Black Sea Coast (South) – along the mouth of Veleka river, together with parent forms, 5 m alt., 03.07.2004, NG-85 (TzR), SOA 56978; in the dense forest of Arkutino locality, 10 m alt., 03.07.2004, NG-68 (TzR), SOA 56970; Znepole region – between the villages Golyam Vurbovnik and Maluk Vurbovnik, 420 m alt., 19.06.2005, FM-67 (TzR), SOA 56955; Sredna Gora Mts (East) – along the road in the village Zelenikovo, 420 m alt., 04.06.2005, LG-49 (TzR), SOA 56962; Rhodopes Mts (East) – uncultivated land in the village Odrintsi, 90 m alt., 15.06.2005, MF-28 (TzR), SOA 56956; along the river in the town Momchilgrad, 452 m alt., 14.06.2005, LG-60 (TzR), SOA 56954; a swamp place under the Perperikon fortress, 480 m alt., 14.06.2005, LG-71 (TzR), SOA 56950; at the road to the village Zhelezino, 396



**Fig. 5.** Distribution map of *R. conglomeratus* × *R. crispus*: A – new data; B – herbarium specimens; C – literature data.

m alt., 14.06.2005, MF-19 (TzR), SOA 56963; Thracian Lowland – after the village Rakovski around irrigation canals, 160 m alt., 04.06.2005, LG-27 (TzR), SOA 56964; ruderal places around the village Brezovo, 240 m alt., 04.06.2005, LG-38 (TzR), SOA 56967.

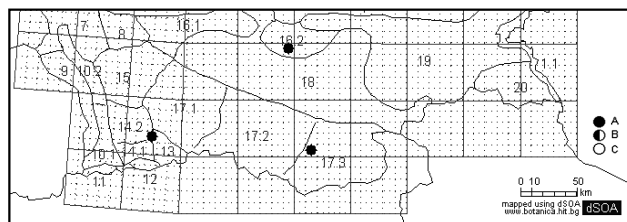
A widely spread hybrid form famous for Romania (Prodan 1952), Greece (Snogerup & Snogerup 1997), Macedonia, Herzegovina (Rechinger 1943). The expanded geographic area during the last decades is probably related to the cosmopolitan spreading of the parent forms.

#### ***Rumex patientia* L. × *R. pulcher* L. (Fig. 6)**

The hybrid is new for the country. There were neither literature data nor deposited materials with Bulgarian origin.

New data: Valley of Mesta River – in the village of Gospodintsi, along the river, together with the parent forms, 560 m alt., 17.06.2005, GM-21 (TzR), SOA 57073; Sredna Gora Mts (East) – the village of Zelenikovo, 420 m alt., 04.06.2005, LG-49 (TzR), SOA 57072; Rhodopes Mts (East) – Momchilgrad town, along the river, together with the parent forms, 452 m alt., 14.06.2005, LG-60 (TzR), SOA 57071.

Data about the broad spreading of the hybrid in Greece were given by Snogerup & Snogerup (1997).



**Fig. 6.** Distribution map of *R. patientia* × *R. pulcher*: A – new data; B – herbarium specimens; C – literature data.

#### ***Rumex conglomeratus* Murray × *R. sanguineus* L. (Fig. 7a)**

This hybrid was reported by Širjaev (1922) for the Preobrazhenie Monastery (together with the parent forms) and Stojanov & Stefanov (1924) with locality near Turnovo. There were no materials deposited of this hybrid form of Bulgarian origin.

Comparative samples: W 1996–05882 (England, Loulsey, 1942); W 1964–14471 (Austria, Rechinger, 1896).

New data: Black Sea Coast (South) – in the thick forest at Ropotamo river, 1.5 m alt., 03.07.2004, NG-68 (TzR), SOA 56969; Rhodopes Mts (East) – about 10 km west from Ivaylovgrad town, along oak forests, 170 m alt., 15.07.2005, MF-38 (TzR), SOA 56985.

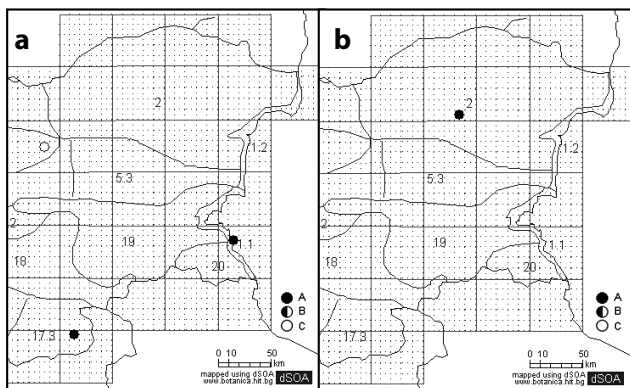
***Rumex confertus* Willd. × *R. obtusifolius* L.** (Fig. 7b)

There were no literature data or materials deposited of this hybrid from Bulgaria.

Comparative samples: WU 1894 (Galicae, rev. Rechinger, 1930); W 1935–1585 (Latvia, Rechinger, 1933).

New data: Northeast Bulgaria – Shoumen district, along the road to village Struino, together with the parent forms, 239 m alt., 16.08.2005, MJ-80 (TzR), SOA 56958.

This highly sterile hybrid with abortive blossoms and underdeveloped valves was identified according to the description by Rechinger (1932).



**Fig. 7.** Distribution map of: a) *R. conglomeratus* × *R. sanguineus*; b) *R. confertus* × *R. obtusifolius*: A – new data; B – herbarium specimens; C – literature data.

***Rumex cristatus* DC. × *R. obtusifolius* L.** (Fig. 8a)

The hybrid is new for Bulgaria. There were no literature data or materials deposited.

New data: Rhodopes Mts (East) – at the village Mandritsa, ruderal places and pastures, together with the parent forms, 100 m alt., 15.06.2005, MF-28 (TzR), SOA 56983.

***Rumex palustris* Sm. × *R. obtusifolius* L.** (Fig. 8b)

This hybrid was established for first time for Bulgaria.

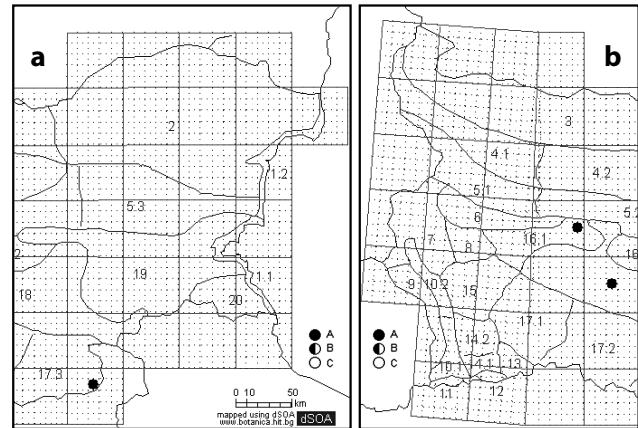
Comparative samples: WU 1565 (Austria, Figert, 1895); WU (Suecica, Murrbek, 1887).

New data: Sredna Gora Mts (West) – above Klisura, along Stryama river, together with the parent forms, 740 m alt., 03.07.2005, KH-92 (TzR), SOA 56981; Thracian Lowland – along Stryama river after the village of Kalekovets, 160 m alt., 04.06.2005, LG-27 (TzR), SOA 56979.

A hybrid between the both taxa is known for Greece (Snogerup & Snogerup 1997).

The surveys show dependence between the spreading of the parent species and the hybrid derivatives – hybrids between ruderal and broadly flexible in ecolog-

ical aspect species are more widely spread, while the hybrid combinations between species with more limited spreading are established only in places where the spreading of the parent species is sympatric.



**Fig. 8.** Distribution map of: a) *R. cristatus* × *R. obtusifolius*; b) *R. palustris* × *R. obtusifolius*: A – new data; B – herbarium specimens; C – literature data.

## Conclusion

The present survey is a contribution to the problems of natural hybridization between the taxa of *R.* subg. *Rumex* in Bulgaria. On the basis of data in the country from the literature and herbarium sheets chorological maps of the known hybrids from the subgenus were made for a first time. The information accumulated and processed so far enriched the chorological information for the natural hybrids of *R.* subg. *Rumex*, object of the present survey. New hybrid combinations were established on the territory of the country: *R. conglomeratus* × *R. crispus*, *R. confertus* × *obtusifolius*, *R. cristatus* × *obtusifolius*, *R. palustris* × *R. obtusifolius* and *R. patientia* × *R. pulcher*. The presence of *R. crispus* × *R. obtusifolius* in the Bulgarian flora was confirmed. The observations showed that the diversity of natural hybrids is bigger than the known till now, so further researches on the natural hybridization of *R.* subg. *Rumex* in Bulgaria are necessary.

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