



Rumex confertus (Polygonaceae) in the Bulgarian flora

Tsvetanka RAYCHEVA

Department of Botany, Agricultural University of Plovdiv, Mendeleev str. 12, 4000 Plovdiv, Bulgaria

ABSTRACT: *Rumex confertus* is an invasive plant to the flora of Bulgaria. The species is the only representative of *Rumex*, sect. *Rumex*, subsect. *Conferti* in Bulgaria. The information about the distribution of the species in the country is contradictory. The material of *R. confertus* were wrongly determined as *R. patientia*, probably because the two species have similar morphological characteristics. Diagnostic morphological parameters and somatic chromosome number of the species $2n = 100$ have been presented. This is the first report of this species chromosome number from the Balkans. New chorological data of the species in the Bulgarian flora have been reported for the Znepole region. The Bulgarian distribution of the species has been mapped.

Key words: Bulgarian flora, chorology, chromosome number, map, *Rumex confertus*, morphology.

Received 21 April 2010

Revision accepted 29 November 2010

UDK 582.665.11(497.2)

INTRODUCTION

Rumex confertus Willd. known as Russian or Asiatic Dock is common and ecologically successful in Central and Eastern Asia, European Russia and Central Europe. The general distribution of the species is Middle Asia, European Russia, Western and Eastern Russia, Western and Eastern Siberia, Middle Europe, Hungary, Poland, Czechoslovakia (RECHINGER 1949, 1964), Romania (PRODAN 1952). The species *R. confertus* has European-Asian area-diagnosis (MEUSEL *et al.* 1965). It is naturalized in North America (BROUILLET *et al.* 2006). In Central and West Europe the species is spread from Eastern Europe by Eastern migration route of adventive plants (JEHLIK *et al.* 2001).

The description and taxonomy of *R. confertus* can be found in RECHINGER (1949).

The ecological success of this species depends to a high degree on its fertility, seed dispersal adaptations, an ability to sprout over a long period of time and a high germination rate. The species is settled mainly in ruderal communities and meadows. It alters penetrated phytocoenoses which leads to a decrease in biological diversity. Growing in meadows it reduces the fodder quality of hay (JEHLIK *et al.* 2001; STOSIK 2006).

In Bulgaria, *R. confertus* have been reported for the first time by URUMOV (1917). In the Bulgarian botanical literature, including the field guide of vascular plants of the country, the species was not mentioned. Only DELIPAVLOV (2003) reported it for Thracian Lowland, based on a publication by LATOWSKI (1993). In the recent field studies the species was registered for NE Bulgaria, Rila Mts. and Vitosha region, except Thracian lowland (RAYCHEVA & DIMITROVA 2007). The aim of the paper is to update and summarize the existing information about *R. confertus* in Bulgarian flora.

MATERIAL AND METHODS

The material for karyological study was collected from 6 natural localities in Bulgaria in the years 2005–2007 (Table 1). Voucher specimens were deposited in the herbarium SOA (Agricultural University, Plovdiv) – abbreviation of herbaria according to HOLMGREN *et al.*, 1990. The chorological data were compiled on the basis of references, revised herbarium specimens and author's field observations. The specimens from Bulgaria identified as *R. confertus* were examined and compared with material from Central Europe and Russia (deposited in SOM, W, and WU).

The floristic regions follow the standard accepted in *Flora R Bulgaria* and localities were mapped according to KOZHUHAROV *et al.* (1983). A corresponding map of distribution based on the 10 km UTM-grid, with the help of dSOA software (STOYANOV 2003) was presented.

A classical squash technique was applied for the karyological studies. Root tips were pretreated with 0.05% colchicine for 2 hours, fixed in ethanol:glacial acetic acid (3:1) for at least 2 hours at room temperature or for 24 hours in the refrigerator, and stored in 96% ethanol until required. Hydrolysis was conducted in 1N HCl at 60°C for 20-40 min. Then the root tips were transferred into HCl:diethyl ether (1:1) for 9 min at 60°C, washed thoroughly in distilled water and stained with haematoxylin after Gomori (MELANDER & WINGSTRAND 1953) for 20-25 min at 60°C. Finally, the root tips were squashed in 45% acetic acid and mounted in Canadian balsam.

RESULTS AND DISCUSSION

Genus *Rumex* L.

Subg. *Rumex*

Subsect. *Conferti* Rech. f.

Chorology and ecology

R. confertus belongs to subsect. *Conferti*. This subsection has following characters: rhizome plants with tendency to vegetative reproduction and large basal leaves, with deeply cordate base and rounded apex; long handles and trichomes on the surface of the leaf blade and leaf stalks. In the Bulgarian flora the subsection is represented only with *R. confertus*. In the Balkan peninsula, the presence of *R. confertus* has been confirmed in Serbia – Mt. Miroč (Veliki Štrbac peak) (DIKLIĆ & NIKOLIĆ 1986) and in Montenegro

Table 1. List of *R. confertus* accessions studied in Bulgaria.

№	Number for floristic region, locality, UTM square, voucher number
1	(2) 35TMH99, Struino village, Shumen district, 241 m, 16.08.2005, SOA 056934
2	(2) 35TMJ52, near Razgrad town, in sunflowers field, 210m, 16.08.2005; SOA 056932
3	(8) 34TGM09, along Iskar river, near Zlokuchene village, 880 m, 13.09.2005, SOA 056935
4	(15) 34TGM09, wet meadows near Belchinski bani village, 919 m, 01.07.2007, SOA 059209
5*	(7) 34TFN34, grassy places around Vrabcha village, Trun district, 883 m, 30.06.2007, SOA 059623
6*	(7) 34TFN34, along to the road, near Trun town, 790 m, 05.06.2006, SOA 059624

Floristic region: 2 – NE Bulgaria; 7 – Znepole region; 8 – Vitosha region; 15 – Rila Mts. * - plant from a new floristic region

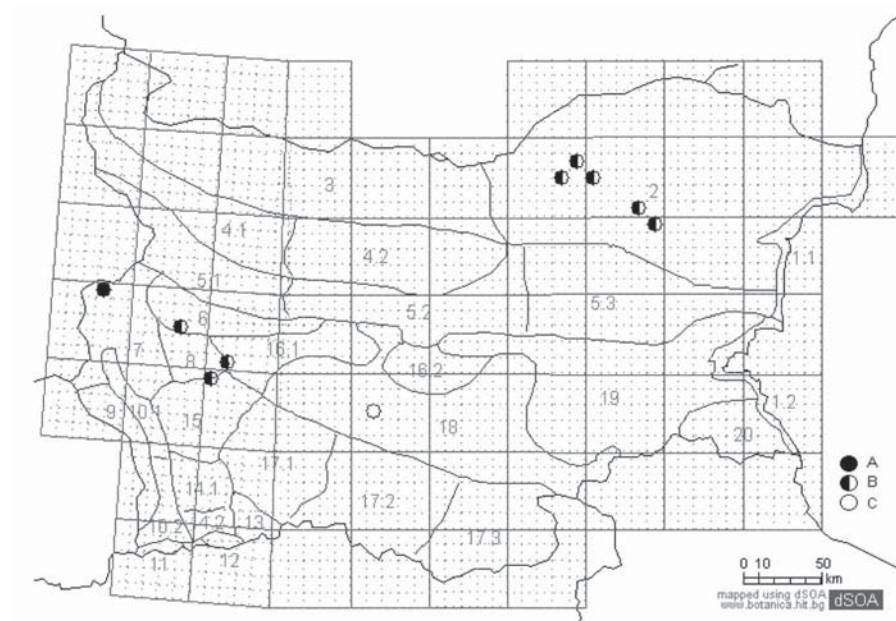


Fig. 1. Distribution map of *R. confertus* in Bulgaria.

Legend of map

- A - new data;
- ◐ B - herbarium specimens and published data;
- C - published data.

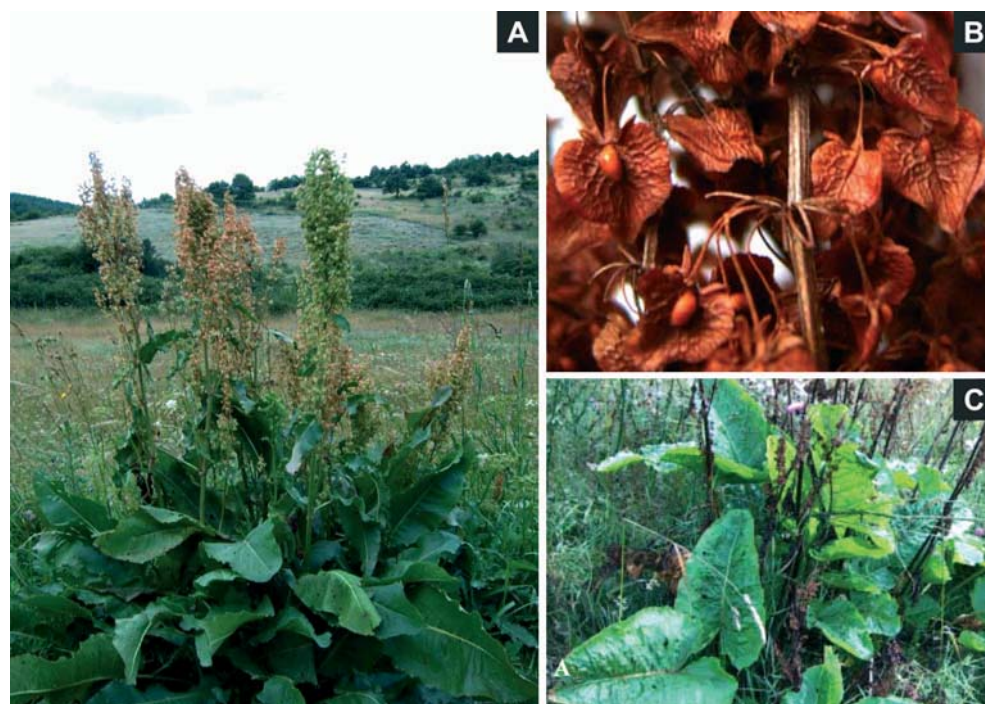


Fig. 2. A – plant habit; B – mature valves; C – basal leaves. Photos by Raycheva (A - Trun district; B, C - near of Shumen town).

Table 2. Morphological characters of *R. confertus* and *R. patientia*.

Character	Values $\bar{x} \pm Sx$ (min-max) mm	
	<i>R. confertus</i>	<i>R. patientia</i>
Valve length	7.08 \pm 0.03 (5.9-8.1)	8.37 \pm 0.05 (6.9-11.3)
Valve width	6.52 \pm 0.02 (5.1-7.9)	7.78 \pm 0.02 (6.7-10.2)
Tubercle length	2.51 \pm 0.03 (2-3)	1.57 \pm 0.01 (1.2-1.9)
Tubercle width	1.36 \pm 0.02 (1.1-1.6)	0.98 \pm 0.01 (0.8-1.2)
Nut length	3.61 \pm 0.01 (3-4.1)	3.12 \pm 0.01 (3-3.8)
Nut width	1.79 \pm 0.03 (1.5-2.4)	1.96 \pm 0.02 (1.8-2.2)
Fruit stalk	8.24 \pm 0.3 (5-10.5)	10.61 \pm 0.05 (7.8-13.5)

– Boka Kotorska bay (Lepetane village) (PULEVIĆ 2005). It has not been reported for the flora of Turkey (CULLEN 1967) and Greece (SNOGERUP & SNOGERUP 1997). The nearest localities of the species are sporadic in different parts of Romania (PRODAN 1952).

The species was recorded in the early 20th century in the region of Sofia as a ruderal plant (URUMOV 1917). It is not clearly recorded the direction of expansion, due to rarity of this species whose populations appear isolated one from another in Vitosha region and Rila Mts. In the course of the current study, the species was registered for first time in Znepole Region (Table 1, Fig. 1). The studies on the population size in Central Europe characterized *R. confertus* as an aggressive, invasive species (JEHLIK *et al.* 2001). *R. confertus* has a high seed production potential. Its

diaspores are adapted to wind dispersal; they have a high germination rate, and exhibit an ability to sprout over a long period of time. Rhizomes of *R. confertus* grow every year and in course of time the plant forms clumps of generative shoots and vegetative rosettes. Such expanded specimen can be easily noticed from a distance. The life strategy of this species is mainly based of vegetative reproduction. These features and vegetative reproduction, as well as its effective capacity make the species a successful, invasive anthropophyte.

In the Bulgarian flora *R. confertus* is sporadically distributed in ruderal communities and meadows, grasslands and damp places in the following floristic regions: Northeast Bulgaria (Shumen and Razgrad district), the foothill of the Vitosha region, Rila Mt. and Znepole Region up to 900 m altitude. (Table 1, Fig. 1).

Morphological characteristics. The materials of *R. confertus* were wrongly determined as *R. patientia*, probably because both species have similar morphological characteristics. This reason, together with the native hybridization in subgenus *Rumex*, makes it difficult to distinguish these two species. The observations have shown that the most taxonomically reliable morphological features of the subgenus *Rumex* are well-developed valves (inner tepals) of the mature plants (length/width of valves and tubercles) - Table 2, Fig. 2., but vegetative characters are also very important. By the comparison of the examined species with *R. patientia*, it can be concluded that *R. patientia* has not basal leaves during the fruitfully period in contrast to *R. confertus*.



Fig. 3. Mitotic metaphase plate of *R. confertus* ($2n = 100$). Scale bars = $5\mu\text{m}$.

R. confertus have been treated by some earlier authors as a subspecies of *R. alpinus* (BOISSIER 1879). The major biological and taxonomical differences determining *R. confertus* as an autonomous species are: stem and leaves indumentum, presence of non-glandular trichomes on the lower surface of the leaf lamina, well-developed 1 (rarely 3) tubercles; also, different ecological niches and altitude ranges, separate *R. confertus* and *R. alpinus*.

Comparative samples: SOM: 96159, 96160 (Kiev, along to the river Dnepr: Lonachewskii 1955); W: 11642, 07029 (Austria: Rechinger 1949); 13233 (Austria: Rechinger 1930); 1997-09001 (Galicia: Woloszczak 1809); 1973-28923 (Wien: Rechinger 1949); 2004-00808 (Austria: Barta 2002); 2004-13439 (Austria: Barta 2003); WU: 3172 (Slovakia: Smejkal 1965).

Karyology. This subgenus *Rumex* is known by its polyploidy series, with somatic chromosome numbers $2n = 20, 40, 60, 80, 100, c. 200$, based on $x = 10$ (LÖVE & LÖVE 1961; FEDOROV 1969; ICHIKAWA *et al.* 1971; DEGRAEVE 1975).

Three different ploidy levels ($2n = 40, 60, 100$) are known to occur throughout the range of *R. confertus* (Table 3). Individuals from six Bulgarian localities were studied cytologically (Table 1). All accessions turned out decaploid $2n = 10x = 100$ (Fig. 3) and these results represent the first chromosome number report of this species from Bulgaria. Also, our results confirm reports by the same species from Central European countries.

Table 3. References about the chromosome number of *R. confertus*.

2n	Origin	Reference
40	Central Europe	LÖVE & LÖVE (1961)
40, 60	Russia	MENSHOKOVA (1964)
40	Ukraine	LÖVE (1986)
60	Poland	MIZIANTY <i>et al.</i> (1983)
60	NE Asia	PROBATOVA & SOCOLOVSKAYA (1989)
40	Siberia, Novosibirsk	KRASNIKOV & SHAULO (1990)
100	Dania, Germany, Latvia	ICHIKAWA <i>et al.</i> (1971)
100	Belgium	DEGRAEVE (1975)
100	Austria	DOBEŠ & VITEK (2000)

CONCLUSION

The distribution of *R. confertus* in Bulgaria based on literature data, herbarium collections, as well as the most recently field studies is presented. The distribution range of *R. confertus* seems to be very dynamic, since the period studied, we recorded increased number of the species localities in different floristic regions in Bulgaria. The species has invasive characteristics and adapts to different ecological conditions. Considering this fact, it is possible that the species have a wider distribution in Bulgaria.

Acknowledgements – The author thanks for financially support of project BG051PO001-3.3.04/17

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REZIME

Rumex confertus (Polygonaceae) u flori Bugarske

Tsvetanka RAYCHEVA

Rumex confertus je invazivna biljka u flori Bugarske. Ova vrsta je jedini predstavnik roda *Rumex*, sect. *Rumex*, subsect. *Conferti* u Bugarskoj. Podaci o rasprostranjenju ove vrste u Bugarskoj su kontradiktorni. Materijal *R. confertus* je pogrešno određivan kao *R. patientia*, najverovatnije prema sličnim morfološkim karakteristikama. U radu se navode dijagnostični morfološki parametri i broj somatskih hromozoma ove vrste $2n = 100$. Ovo je ujedno i prvi put utvrđeni broj hromozoma kod ove vrste sa Balkana. Novi horološki podaci o ovoj vrsti u flori Bugarske navode se za oblast Znepole. Mapirana je distribucija ove vrste u Bugarskoj.

Ključne reči: Flora Bugarske, horologija, broj hromozoma, mapa, *Rumex confertus*, morfologija.

