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CHOROLOGY AND ECOLOGY OF *RUMEX CONFERTUS* WILLD. IN THE CZECH REPUBLIC

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Abstract

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The chorology and ecology of *Rumex confertus* Willd. in the Czech Republic is reviewed. In Central Europe *R. confertus* behaves as an invasive adventive plant of Eastern migration route. In the Czech Republic four localities of the species, with the status ephemerophyte to epoecophyte occur. The locality Praha-Lochkov on the west margin of secondary distribution area of *R. confertus* was described. The plant is established in the abovementioned locality in stands of the *Arction lappae* Tüxen 1937 em. Gutte 1972 alliance.

Keywords: *Rumex confertus*, chorology, ecology, adventive plant, introduction, ephemerophyte, epoecophyte, Czech Republic, Europe.

INTRODUCTION

The first records of a new adventive species, *Rumex confertus* Willd. in the Czech Republic (1965), were published in 1967 (Jehlík & Kopecký, 1967). Since then the number of known localities has increased to four. Only the locality Praha-Lochkov has the enduring character (epoecophyte). The paper presents the data on the chorology and ecology of *R. confertus* especially in the Czech Republic and briefly in the whole area of distribution. The species description and other data can be found mainly in A. S. Lozina-Lozinskaja (1936) and K. H. Rechinger (1957, 1964).

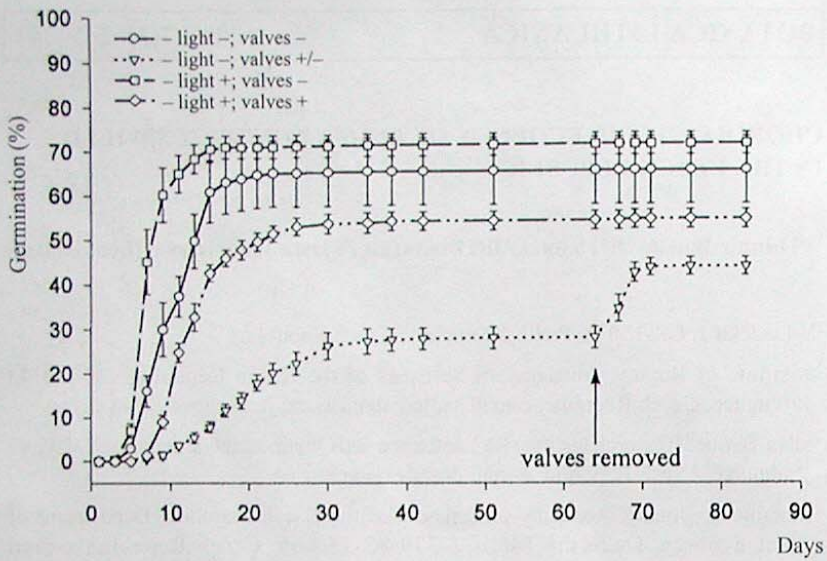

Fig. 1. Germination of *Rumex confertus* Willd. at room temperature (19–22 °C)

MATERIAL AND METHODS

In the territory of the Czech Republic partly the floristic research was made, partly specimens in the herbarium collections were studied (abbreviations of herbaria according to P. K. Holmgren et al., 1990). The climate diagram of Praha was constructed according to the method of H. Walter (1955) and H. Walter & H. Lieth (1960). The coverage and the sociability in relevés were used according to J. Braun-Blanquet (1964). The chromosome number was determined by V. Jarolímová from roots of germinating young plants of *R. confertus* (locality No. 1). Germination of *R. confertus* (Fig. 1) was studied by L. Klimeš. The seeds were collected in summer 1996 by J. Sádlo in Praha-Lochkov from plants growing together at a single locality. The experiment was performed next winter on Petri dishes at room temperature (19–22 °C). Four treatments were used: a) seeds without valves germinated in dark, b) seeds without valves germinated under full light, c) seeds inserted in valves and germinated in dark and d) seeds in valves germinated under full light. In the last treatment valves of not germinated seeds were removed after 64 days to test the effect of the delayed valve removal. The experiment was carried out with five replications, with 100 seeds put on filter paper in each Petri dish. Thus, 2000 seeds were used in the experiment.

CHOROLOGY AND ECOLOGY IN THE AUTOCHTHONOUS AND SECONDARY DISTRIBUTION AREA

K. H. Rechinger (1957) considers *R. confertus* as a native species in East and West Siberia, European Russia, Poland, Transylvania (Siebenbürgen), and Hungary. The description of the autochthonous distribution area of the species from H. Trzcińska-Tacik (1963)

is apparently more detailed: In Europe "it presumably extends in a parallel belt from Podolia (in the Ukraine) in the west to the province Tomsk in the east (Siberia). This is in accordance with the fact that the species is common in the area and occurs in habitats, both secondary and seminatural, as well as in natural communities typical of that territory (meadow-steppe and glades in forest-steppe)". According to R. Soó (Rechinger, 1957), in a phytocoenological way *R. confertus* behaves in Central Europe as the species from the order *Onopordetalia*, or occurs in stands from the alliance *Arction* and *Alopecurion pratensis* (Soó, 1980). According to the recently published phytogeographical map of *R. confertus* in Europe (Jalas & Suominen, 1988, map 453) it appears to be as an autochthonous widely spread species in East Europe. In the last decades the species spread from there to the west, the northwest, and the north (cf. Trzcińska-Tacik, 1963; Jehlík & Kopecký, 1967; Prasse, 1996; Often & Alm, 1997). An isolated occurrence of the species is on montane meadows in Apennines, 1100–1550 m a. s. l. (Pignatti, 1982). *R. confertus* is very probably native to the following countries and territories: European Russia excepting North, Transcaucasia, Central Asia, South Siberia, Ukraine, Belorussia, South East Poland, Rumania, Hungary, South Slovakia, Italy (?). Secondary occurrences and spreading were recorded in East Asia in environs of Vladivostok (Far East), North Russia, Baltic Region, great part of Poland, East Slovakia, the Czech Republic, Austria, Germany, Finland, Norway, Sweden, Britain. The conspectus concerning the distribution area of *R. confertus* was summarized mainly according to publications (Bajtenov & Pavlov, 1960; Dostál, 1991; Gudžinskas, 1999; Holub & Moravec, 1965; Jalas & Suominen, 1988; Jehlík & Kopecký, 1967; Klokov, 1952; Krylov, 1930; Lozina-Lozinskaja, 1936; Natkevičaitė-Ivanuskienė, 1961; Often & Alm, 1997; Pignatti, 1982; Prasse, 1996; Rechinger, 1950, 1957, 1964; Savulescu, 1952; Soó, 1980; Sumnevič, 1953; Trzcińska-Tacik, 1963).

In the centre of its distribution area, in the former Soviet Union, *R. confertus* is growing on meadows, in forests (Lozina-Lozinskaja, 1936), and on riverbanks (Vorošilov et al., 1966),

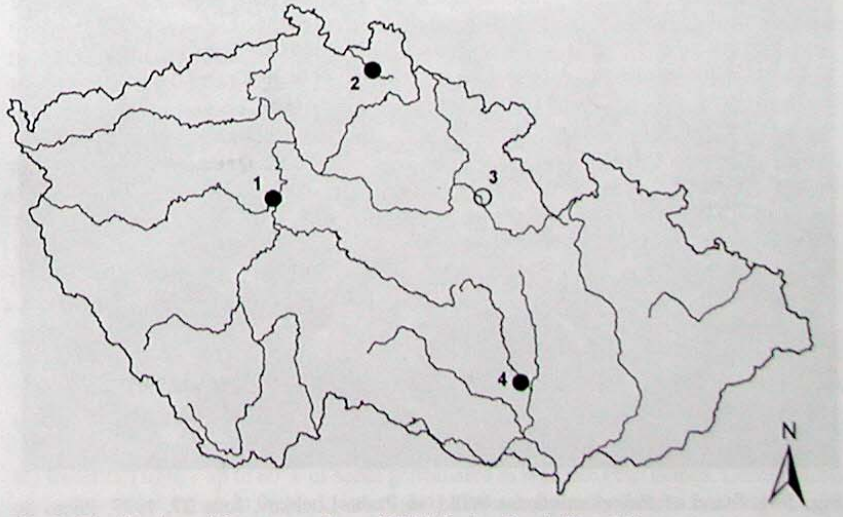

Fig. 2. Distribution of *Rumex confertus* Willd. in the Czech Republic

Fig. 3–4. Stand of *Rumex confertus* Willd. in Praha-Lochkov, June 27, 1999. Photo by J. Dostálek

in the territory of the so-called "celina", even as weed in different agricultures (Vasil'eva & Macenko, 1964), in Kazachstan locally as a weed in the pasture-land (Bajtenov & Pavlov, 1960). In the European part of the former Soviet Union *R. confertus* is considered the most difficult weed of flood meadows in valleys of large rivers (Almazova & Rabotnov, 1953). In Lithuania the species is probably grain immigrant, or it immigrated with seeds of cultivated grasses. There it grows on meadows, road sides, railway embankments, forest edges, waste lands, river banks (Gudžinskas, 1999). In Central Europe *R. confertus* occurs both at the ruderal habitats along communications in settlements and on inundated meadows in river basins (Trzcińska-Tacik, 1963).

The generative reproduction of *R. confertus* was studied on flood-plain meadows of the river Oka near village Dedinovo in Central Russia (Almazova & Rabotnov, 1953). The germinability of the species was 90–98 %. However, the majority of young plants later died. After 4 years only about 1 % of young plants remained. The authors did not consider that the plants would be fertile sooner than in 10 years.

In Central and West Europe *R. confertus* is spreading from East Europe by Eastern migration route of adventive plants (Jehlík, 1998; cf. Prasse, 1996; Often & Alm, 1997).

CHOROLOGY AND ECOLOGY IN THE CZECH REPUBLIC

In the Czech Republic, *R. confertus* was first discovered in Liberec (August 11, 1965) and Týniště nad Orlicí (Jehlík & Kopecký, 1967). Later two other localities were found, in Brno and Praha (Fig. 2). While 3 localities were more or less of ephemere character (ephemerophyte), the locality in Praha, which lies on the west margin of the secondary distribution area of the species in Central Europe, is of permanent character (epoecophyte). Therefore, significant attention is paid to the locality No. 1 (Praha-Lochkov).

The localities are quoted according to the latest administrative subdivision of the Czech Republic – see Anonymous (1994).

1. Praha: Praha-Lochkov, the stand of several square metres (Fig. 3–4) on margin of road from Praha-Lochkov to Velká Chuchle behind the village in the part "Na lípách" beside a field; 335 m a. s. l.; September 1994 (J. Sádlo), 1996 (V. Jehlík, Herb. Jehlík), 1999 (V. Jehlík, Herb. Jehlík) (Photo J. Dostálek, Fig. 3–4), 2000 (V. Jehlík). 2n = 100 (det. V. Jarolímová).

R. confertus grows there on the loess-like loam at a field road next to shrubs in the moderately warm region (sensu Vesecký et al., 1958). The climatic conditions at the locality are very well characterised by the climate diagram of Prague (Fig. 5). From phytocoenological view-point the stand pertains to the order *Arction lappae* Tüxen 1937 em. Gutte 1972. *R. confertus* prospers there very successfully. It reaches up to 172 cm height (June 1999). At this locality *R. confertus* is also very fertile and its seeds are highly germinable (Fig. 1).

It is very probable that *R. confertus* was earlier casually introduced to the locality Praha-Lochkov from East or South-East Europe with the rest of fodder for horses from the racetrack Praha-Chuchle (about 3 km from Praha-Lochkov). Fodder was delivered probably from the East for turf-team horses. The stand of *R. confertus* is characterised by 2 vegetation relevés, noticed at the same place in 1996 and 1999 (Table 1, Fig. 3–4).

The highest rate of germination was obtained for seeds with removed valves germinated under full light – up to 80 % of seeds germinated in separate Petri dishes. Germination of seeds without valves in the dark was slightly slower but finally there was no significant difference between these two treatments. Germination of seeds in valves was substantially

Table 1.

Community dominated by *Rumex confertus* Willd. (Praha-Lochkov)

Date		September 7, 1996	June 6 and July 26, 1999
Area of relevé (m^2)		16	16
Orientation		SE	SE
Slope (°)		5	5
Altitude (m a.s.l.)		335	335
Coverage (%)	Herbs	80	90
	Bryophytes	–	1
Number of species		21	28
1		2	3
Rumex confertus Willd.		3.3	3.2–3
Arction lappae Tuxen 1937 em. Gutte 1972			
Arctium tomentosum Mill.		r.2	+.2
Lamio albi-Chenopodietalia boni-henrici Kopecký 1969			
Alliaria petiolata (M. Bieb.) Cavara et Grande		.	+.2
Geum urbanum L.		r.2	(+.2)
Galio-Urticetea Passarge ex Kopecký 1969			
Galium aparine L.		+	2.1–3
Urtica dioica L.		.	1.2
Accompanying species			
Achillea millefolium L.		r.2	.
Agropyron repens (L.) P. Beauv.		1.2	1.2
Anthriscus sylvestris (L.) Hoffm.		+.2	2.2
Arrhenatherum elatius (L.) J. Presl et C. Presl		2.2	2.2
Artemisia vulgaris L.		+.2	+.2
Bromus sterilis L.		.	r.2
Carex muricata aggr.		r	.
Chenopodium album L. (juv.)		r	.
Cirsium arvense (L.) Scop. subsp. *arvense*		1.2	+.2
Convolvulus arvensis L.		r	1.2
Coronilla varia L.		r.2	+.2
Dactylis glomerata L.		+.2	1.2
Festuca pratensis Huds.		.	(r.2)
Fragaria sp.		r	.
Galium verum L.		r.2	r.2
Hypericum perforatum L.		r.2	r.2
Lactuca serriola L.		+	+

Table 1 (continued).

1	2	3
Myosoton aquaticum (L.) Moench	.	r.2
Poa pratensis L., s. str.	.	2.2
Poa trivialis L.	.	+.2
Potentilla reptans L.	2.2	2.1–2
Rosa sp.	.	+
Taraxacum sect. *Ruderalia* Kirschner et al.	.	+.2
Torilis japonica (Houtt.) DC.	.	+.2
Tripleurospermum perforatum (Mérat) Laínz	.	(+)
Veronica chamaedrys L.	+.2	.
Vicia tetrasperma (L.) Schreber	.	r
Bryophytes		
Eurhynchium hians (Hedw.) Sande Lac.	.	1.1
Pottia cf. *truncata* (Hedw.) Bruch et Schimp.	.	+
Weissia sp.	.	+

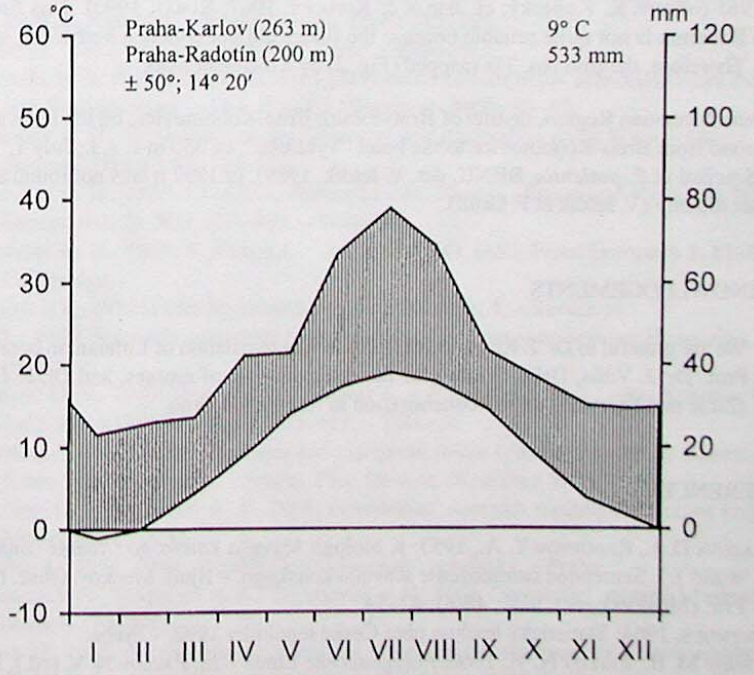

Fig. 5. Climate diagram from the meteorological station Praha

reduced, especially in the dark, where less than 30 % of seeds germinated. After 64 days the valves were removed and further germination increased by 15 %.

First seeds germinated after 3–4 days (seeds without valves) and after 6 days (seeds with valves). The final number was obtained after 17 days of seeds germinated in the light without valves; germination of seeds with valves in the dark was the slowest – it took about 30 days.

Germination pattern of *R. confertus* seeds well corresponds with that of other invasive and spreading *Rumex* species. There is no evidence of dormancy. The valves prolong and supress seed germination. Full light is not necessary for germination, but it may increase both the speed and the final percentage of germinated seeds, especially seeds in valves.

2. North Bohemian region, District of Liberec: Liberec – one individual in the main railway station on the bushy slope at a rail near the railway depot, together with *Valeriana repens* Host; 377 m a. s. l.; August 11, 1965 (V. Jehlík, Herb. Jehlík; Jehlík & Kopecký, 1967; Kubát, 1990), 1967, 1968 (both V. Jehlík). Later this microlocality was disturbed by the reconstruction of the railway station. – In 1975 a new microlocality of *R. confertus* was discovered in outskirts of the main railway station in other place: one plant near a stand of *Oenothera ammophila* Focke var. *ammophila*; 377 m a. s. l.; July 11, 1975.

3. East Bohemian Region, District of Rychnov nad Kněžnou: Týniště nad Orlicí, one individual on margin of a shallow ditch in outskirts of the railway station; 250 m a. s. l.; August 11, 1965 (observ. K. Kopecký; cf. Jehlík & Kopecký, 1967; Kubát, 1990). This finding from Bohemia is not quite reliable because the finder did not collect a herbarium specimen. Therefore, the find No. 3 is mapped (Fig. 2) by a different mark.

4. South Moravian Region, district of Brno-město: Brno-Kohoutovice, on the lawn at the new road from Brno-Kohoutovice to the hotel "Vyhlídka"; ca 350 m a. s. l.; July 1, 1979 (M. Smejkal ut *R. patientia*, BRNU, det. V. Jehlík, 1989). In 1997 it was not found at the former locality (V. Jehlík et F. Grüll).

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REFERENCES

Almazova D. I., Rabotnov T. A., 1953: K biologii ščavelja konskogo (*Rumex confertus* Willd.). I. Semennoe razmnoženie ščavelja konskogo. – Bjull. Moskov. Obšč. Ispyt. Prir. (Moskva), sect. biol., **48(6)**: 47–54.

Anonymous, 1964: Statistický lexikon obcí České republiky 1992. – Praha.

Bajtenov M. B., Pavlov N. V., 1960: *Polygonaceae* Lindl. – In: Pavlov N. V. (ed.), Flora Kazachstana, **3**: 90–179. – Alma-Ata.

Braun-Blanquet J., 1964: Pflanzensoziologie. Grundzüge der Vegetationskunde (ed. 3). – Wien–New York.

Dostál J., 1991: Vel'ký kl'úč na určovanie vyšších rastlín. **1**. – Bratislava.

Gudžinskas Z., 1999: Conspectus of alien plant species of Lithuania. 12. *Amaranthaceae* and *Polygonaceae*. – Botanica Lithuanica, **5(4)**: 313–326.

Holmgren P. K., Holmgren N. H., Barnett L. C., 1990: Index herbariorum. Part I. The herbaria of the world (ed. 8.). – Regnum Veg. (Utrecht), **120**: 1–693.

Holub J., Moravec J., 1965: Floristische Materiale aus dem Hügellande Fil'akovská hornatina (Südslowakei). – Biol. Práce (Bratislava), **11(6)**: 1–91.

Jalas J., Suominen J. (eds.), 1988: Atlas Florae Europeae, **2**. – Cambridge.

Jehlík V. (ed.), 1998: Cizí expanzivní plevele České republiky a Slovenské republiky. – Praha.

Jehlík V., Kopecký K., 1967: *Rumex confertus* Willd. – nová adventivní rostlina v Čechách. – Zpr. Čs. Bot. Společ. (Praha), **2**: 172–175.

Klokov V. M., 1952: Rodina XLI. Grečkovy – *Polygonaceae* Lindl. – In: Kotov M. I. (ed.), Flora URSR, **4**: 190–259. – Kiiv.

Krylov P., 1930: Flora Sibiriae Occidentalis. *Salicaceae–Amarantaceae*, **4**. – Tomsk.

Kubát K., 1990: 1. *Rumex* L. – Šťovík. – In: Hejný S., Slavík B. (eds.), Květena České republiky, **2**: 311–332. – Praha.

Lozina-Lozinskaja A. S., 1936: Rod 390. Ščavel' – *Rumex* L. – In: Komarov V. L. (ed.), Flora SSSR **5**: 444–482. – Moskva–Leningrad.

Natkevičaitė-Ivanauskienė M. (ed.), 1961: Lietuvos TSR flora, **3**. – Vilnius.

Often A., Alm T., 1997: Russehøymol – *Rumex confertus* Willd. – i Norge og tilgresende strøk av Russland. – Blyttia (Oslo), **55(4)**: 189–199.

Pignatti S., 1982: Flora d'Italia. Vol. Primo. – Bologna.

Prasse R., 1996: *Rumex confertus* Willd., ein Bestandteil der wildwachsenden Flora Berlins und Brandenburgs. – Flor. Rundbr. (Bochum), **30(2)**: 80–82.

Rechinger K. H., 1950: Notizen zur Adventiv- und Ruderalflora von Wien. – Österr. Bot. Zeitschr. (Wien), **97**: 114–123.

Rechinger K. H., 1957: CCXXIX. *Rumex* L. – In: Hegi G., Illustrierte Flora von Mittel-Europa (ed. 2), **3(1)**: 353–400. – München.

Rechinger K. H., 1964: 8. *Rumex* L. – In: Tutin T. G. (ed.), Flora Europaea **1**: 82–89. – Cambridge.

Săvulescu T., 1952: Flora Republicii populare Române, **1**. – Bucureşti.

Soó R., 1980: Synopsis systematico-geobotanica florae vegetationisque Hungariae, **6**. – Budapest.

Sumnevič G. P., 1953: Rod 218. (2). *Rumex* L. – Ščavel'. Otkulok. – In: Korovin E. P. (ed.), Flora Uzbekistana, **2**: 102–113. – Taškent.

Trzcińska-Tacik H., 1963: Badania nad zasięgami roślin synantropijnych. 2. *Rumex confertus* Willd. w Polsce. – Fragm. Flor. Geobot. (Kraków), **9(1)**: 73–84.

Vasil'eva L. I., Macenko A. J., 1964: Opredelitel' sornykh rastenij Celinnogo kraja. – Moskva–Leningrad.

Vesecký A., 1958: Atlas podnebí Československé republiky. – Praha.

Vorošilov V. N., Skvorcov A. K., Tichomirov V. N., 1966: Opredelitel' rastenij Moskovskoj oblasti. – Moskva.

Walter H., 1955: Die Klimadiagramme als Mittel zur Beurteilung der Klimaverhältnisse für ökologische, vegetationskundliche und landwirtschaftliche Zwecke. – Ber. Deutsch. Bot. Ges. (Stuttgart), **68**: 331–344.

Walter H., Lieth H., 1960: Klimadiagramm-Weltatlas. 1. Lieferung. – Jena.

RUMEX CONFERTUS WILLD. EKOLOGIJA IR PAPLITIMAS ČEKIJOJE

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Santrauka

Straipsnyje apžvelgiamas *Rumex confertus* Willd. paplitimas Čekijoje ir augalo biologijos ypatumai. Vidurio Europoje *R. confertus* yra sparčiai plintantis adventyvinis augalas. Dabar Čekijoje žinomos keturios *R. confertus* augimvietės. Vienoje iš jų – esančioje prie Praha-Lochkovo – šios rūšies augalai natūralizavęsi, o kitose trijose augimvietėse augančius *R. confertus* augalus reikėtų priskirti prie efemerofitų arba epekofitų grupių. Radimvietė prie Praha-Lochkovo yra ties dabartinio rūšies paplitimo arealo vakarine riba. Čia *R. confertus* auga *Arction lappae* Tüxen 1937 em. Gutte 1972 sąjungos bendrijose.

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