

FLORISTIC STATUS AND DISTRIBUTION TRENDS OF *ROSA RUBIGINOSA* L. IN LATVIA

Pēteris Evarts–Bunders*, Gunta Evarte–Bundere, Maija Medne,
Aiva Bojāre

Evarts–Bunders P., Evarte–Bundere G., Medne M., Bojāre A. 2023. Floristic status and distribution trends of *Rosa rubiginosa* L. in Latvia. *Acta Biol. Univ. Daugavp.*, 23(2): 231-244.

Abstract

Rosa rubiginosa L. is a rare and protected species and was included in the last Red Data book of Latvia as endangered species (EN) and recognized as data deficient (DD) species in neighbouring Baltic States. The occurrence of the species in Latvia is decreasing. The species could be threatened by shifting agriculture, transforming grassland areas into fields, and habitat shading caused by the overgrowth of dry grasslands because of natural succession and eutrophication. During our studies, all available *Rosa rubiginosa* specimens in main Latvian herbariums (HBA, DAU, LATV, RIG) were analysed. The largest part of the previously known localities of *R. rubiginosa* were re-inventoried. In total, 70 % of studied sites *R. rubiginosa* grew in suitable natural habitats – calcareous grasslands, calcareous slopes, and roadsides, as well as dry pine forests, usually on the river banks or on a seashore. However, 23 % of studied *R. rubiginosa* localities can be recognized with unclear, possible dual status – roadsides. Only 7 % of species localities were found in clearly cultivated places. In most cases, the species grew in natural or semi-natural habitats sparsely in Latvia. *Rosa rubiginosa* was found as an anthropophyte, similar, as it is elsewhere in the Baltic States. At the same time, even in the cultivated areas, the species may have originated from the wild. We concluded that the species most likely has a dual origin. Based on the dynamics data in Latvia, we concluded that the localities of species are decreasing. *Rosa rubiginosa* was found in only 44 sites. The total size of the population in the country is small – around 350 specimens, so there is reason to consider the species as rare and endangered and to include it in the list of protected species.

Keywords: Latvia, distribution, Red Data book, *Rosa rubiginosa*, floristics

*Corresponding author: Pēteris Evarts–Bunders. Institute of Life Sciences and Technology, Daugavpils University, Daugavpils, Parādes Str. 1a, LV-5401, Latvia. Latvian society of dendrologists, Miera Str. 1, Salaspils LV-2169, Latvia, E-mail: peteris.evarts@biology.lv

Gunta Evarte–Bundere. Institute of Life Sciences and Technology, Daugavpils University, Daugavpils, Parādes Str. 1a, LV-5401, Latvia. Joint Stock Company “Latvia's State forests”, Vaiņodes Str. 1, LV-1004, Rīga, Latvia. Latvian society of dendrologists, Miera Str. 1, Salaspils LV-2169, Latvia

Maija Medne. Institute of Life sciences and technology, Daugavpils University, Daugavpils, Parādes Str. 1a, LV–5401, Latvia. Latvian society of dendrologists, Miera Str. 1, Salaspils LV–2169, Latvia

Aiva Bojāre. Institute of Life sciences and technology, Daugavpils University, Daugavpils, Parādes Str. 1a, LV–5401, Latvia. Dendroflora Department, National Botanical gardens, Miera Str. 1, Salaspils LV–2169, Latvia. Latvian society of dendrologists, Miera Str. 1, Salaspils LV–2169, Latvia

INTRODUCTION

Rosa rubiginosa L. (Rosaceae), the Sweetbriar or Eglantine is native to most of Europe except for the extreme north, western Asia (Caucasus) (Kláštěský 1968, Zieliński 1985, Hultén & Fries 1986, Kurtto et al. 2004). The boundaries of the distribution of the species are relatively unclear because both in Europe and in other parts of the world it widely passes into the wild. It is considered invasive and forms adventive or even invasive populations in North and South America, South Africa, Australia, and New Zealand (Weber 2003, Zimmerman et al. 2010).

Scientific research and literature on the study of Latvian wild roses have a history of almost 250 years from the work of J. B. Fischer, the first naturalist, and student of C. Linnaeus, on the flora of Livland in 1778, in which only one species, *Rosa majalis* Herrm., was mentioned (Fischer 1778) *Rosa rubiginosa*, cited for the first time in the Baltic scientific literature in the work of W. C. Friebe (as *Rosa eglanteria* L, nom. ambig.) (Friebe 1805). Later, the species was also mentioned by several other Baltic naturalists of the 19th century and their works provide data on the morphology, distribution, and characteristic habitats of *Rosa rubiginosa* (Fleischer & Lindemann 1839, Wiedemann, Weber 1852, Klinge 1882, Klinge 1883, Lehmann 1895). The studies from the 19th century emphasized the dual status of the species. *Rosa rubiginosa* is mentioned as relatively common both growing wild on sunny slopes, forest edges, and in anthropogenic places, for example, around castle ruins and masonries. The species was rather

widely cultivated both as the main species and as varieties in hedges and gardens. In the 20th century several well-known Baltic and Latvian rhodologists were paying more attention to the research of this taxonomically difficult group: famous Baltic naturalist K. R. Kupffer, whose main contribution is extensively collected herbarium with more than 40,000 units, many of them – genus *Rosa*, as well as different publications in plant geography and explaining the distribution of species (Kupffer 1899, Kupffer 1925, Kupffer 1927), as well as K. Starcs (Starcs 1925), P. Galeniēks (Galenieks 1935, Galenieks 1957), I. Riekstiņš (Riekstiņš 1977, Riekstiņš 1980), D. Šmite (Šmite 1977, Šmite 1979, Šmite 1986, Šmite 1986) and R. Cinovskis (Cinovskis et al. 1974, Cinovskis 1979).

In the Baltic region, *Rosa rubiginosa* is rarely and unevenly found. In Estonia, the species reaches the NE border of a natural distribution area (Šmite 1988, Šmite 1996, Navasaitis et al. 2003, Kukk et al. 2020), while the species is considered an anthropophyte in Finland (Väre et al. 2021). In Latvia, the species is considered as an element of the Western European flora, which grows in the wilderness mostly in the central and western parts of the country (Riekstiņš 1980, Šmite 2003). The border of species natural distribution crosses the country. In our conditions, *R. rubiginosa* is characterized by a sporadic distribution. There are no data on changes in the occurrence of the species in the last 30 years in Latvia. However, from earlier literature sources it can be concluded that the distribution of the species in the regions of intensive agriculture has decreased significantly.

Historical evidence shows that the species was frequently occurring (Galenieks 1935, Galenieks 1957). Later in the 20th century data showed that regions of the distribution of the species have decreased, and only one region around Dobeles is mentioned, where the species is common (Riekstiņš 1980). At the end of 20th century the species was recognized as relatively rare in Latvia, mainly in Western Latvia, but some localities in the Daugava Valley, Vidzeme and Zemgale were also indicated (Šmite 1996). The species has been included in the Latvian Red Book since 2003 (Šmite 2003). The distribution of *R. rubiginosa* in Latvia is found also in Atlas of Latvian woody plants (Laiviņš et al. 2009), where 332 localities of the species historical localities were shown on a map, but without geographical coordinates or any other additional information about these localities.

The natural habitats of the *Rosa rubiginosa* are related to very narrow ecological requirements – the species is calciphyte and it is considered an indicator of calcareous soil (Riekstiņš 1980). The species occurs in dry, calcareous grasslands, dry slopes, and many occurrences are associated with river and lake valleys, as well as with secondary habitats – roadsides and hedgerows (Galenieks 1957, Graham & Primavesi 1993).

Occurrence of the species in Latvia has a decreasing trend. We can hypothesize that the species is threatened by changing agriculture, transforming grassland areas into crop fields, and habitat shading caused by the overgrowth of dry grasslands. Natural succession and eutrophication also have a significant negative impact, as well as intensive mowing of roadsides (Riekstiņš 1980).

Considering the decrease of suitable habitats because of the intensification of agriculture and natural succession in Latvia, it is necessary to check the current localities of *Rosa rubiginosa* and specify the size of the population of the species and the distribution dynamics.

The Society of Dendrologists of Latvia has selected *R. rubiginosa* as a Tree of the year 2023 in Latvia as a species with a decreasing distribution.

The study aim was to evaluate available data about *R. rubiginosa*, to revise species specimens in the largest herbariums in Latvia and make species inventories in natural localities and suitable nearby habitats, to clarify the size of the population in Latvia. The objectives of the study was: 1) to clarify the floristic status of *R. rubiginosa* in Latvia; 2) to analyse and evaluate habitats with *R. rubiginosa*.

MATERIAL AND METHODS

A revision was conducted in historical, previously known localities of *R. rubiginosa* and was made of all available *R. rubiginosa* specimens in the largest Latvian dendrological herbarium collections: National Botanical Gardens, Dendroflora Department, Salaspils (HBA, 95 herbarium specimens, including 30 specimens, collected by rhodologist I. Riekstiņš).

Rosa rubiginosa specimens were revised from the following sources:

Daugavpils University, Institute of Life Sciences and Technology, Laboratory of Botany, Daugavpils (DAU, 42 herbarium specimens).
University of Latvia, Institute of Biology, Laboratory of Botany, Rīga (LATV, 25 herbarium specimens)

University of Latvia, Museum of Botany, Rīga (RIG, 62 herbarium specimens).

Herbarium of Alfrēds Rasiņš, Rīga (RAS, 23 herbarium specimens)

Herbarium of Slītere Nature Reserve, Rīga (SVR, 5 herbarium specimens).

During our studies, a total of around 250 herbarium specimens were revised, largest part – 67 % (177 from 262) of historical localities were re-inventoried. The species was found, and the herbarium was collected in 44 sites during our field studies (Fig. 1).

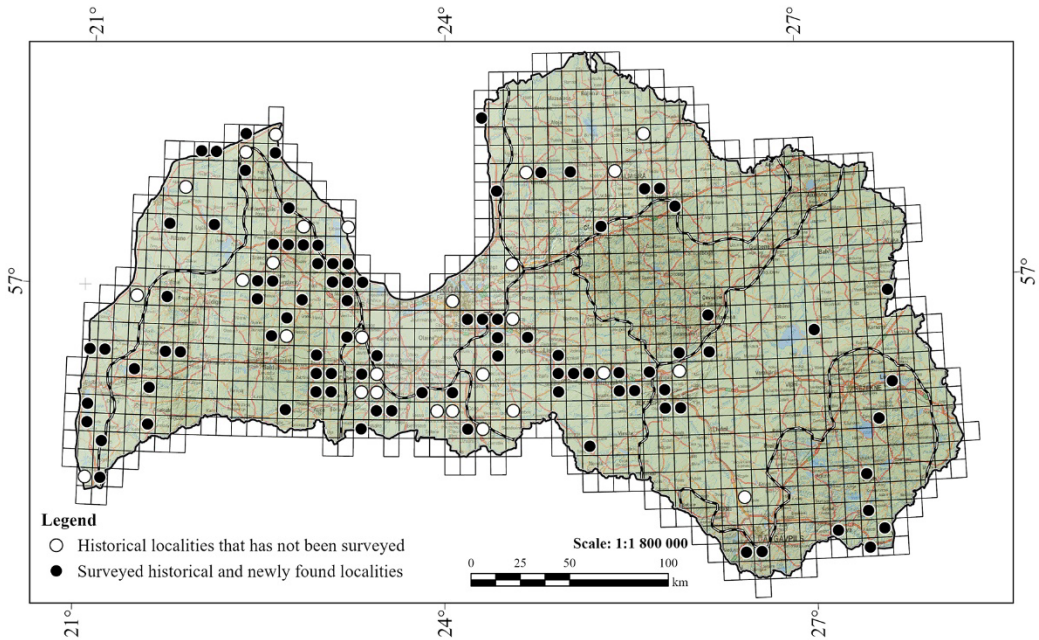


Figure 1. All historical localities from the 19th century to the 1980s (white circle) of *Rosa rubiginosa* L. in Latvia and inventoried localities (2021–2023) (black circle), marked in grid cells. ©Māris Nitcis.

Historical *Rosa rubiginosa* records were studied, which are indicated both in the literature and known from the material of the historical herbariums. The first *R. rubiginosa* localities in the literature were found in the 19th century (Lehmann 1895), where species localities in Krustpils and Jēkabpils were mentioned that still exist today. Later these localities were also mentioned in the dissertation of P. Galeniks (Galeniks 1935) and in the flora of the Latvian SSR (Galeniks 1957). As far as possible, most of the localities indicated in the literature and herbariums were surveyed in 2021 and 2023, especially the relatively recent ones, including the period after the Second World War until 1990.

Species distribution maps were prepared by applying the square method using a standardized geobotanical grid cell map, which is related to the geographical coordinates, where one square or geobotanical grid cell corresponds approximately to 7.6×9.3 km or 71

km² for Latvia. The maps were made for the analysis of the age of localities and the dynamics of species distribution across Latvia. Therefore, the species occurrence is shown in three stages:

1. The research at the 19th–20th centuries till 1940.
2. The period from 1941 till 1990 (World War II and the years of Soviet occupation when Latvia experienced significant changes in land processing methods and transport flow, mainly the flow of railway transport from the East).
3. 1991 – till nowadays, when land processing methods and directions of transport flow have significantly changed. For arboreal plants we can regard the localities as relevant if they have been surveyed and the plant in it has been identified within the last 30 years, therefore the actual distribution of the species can be discussed only according to the locality maps made after 1990.

When surveying the deposits of *R. rubiginosa*, the number of specimens in the deposit was evaluated and the total population size in the country was calculated. All the mature and producing shrubs were listed, as well as the young seedlings and, possibly, the young specimens of *R. rubiginosa* that have propagated vegetatively by root shoots. The status of the naturalness of the locality was also analysed:

- clearly planted specimens (groups in parks, hedges),
- secondary localities in various contact zones – roadsides, ditches, where the locality can have a dual origin – has gone wild from culture, especially if there are any dendrological plantations in the immediate vicinity, where this species has been planted in the past, or "repressed" from the natural habitats in case of the destruction of the surrounding natural habitats,
- completely natural localities in natural calcareous habitats with a relatively low anthropogenic load.

RESULTS AND DISCUSSION

Rosa rubiginosa L. (*R. eglanteria* L.) in Latvian climatic conditions is a 1–3 m tall shrub with usually erect stems and straight, expanded branches. Prickles strong, stout and hooked up to 14 mm long, greenish–yellow, or red, often tapering from the broad base, usually located below the leaf bases, but sometimes also on internodes, often scattered with small straight prickles and glandular hairs. Large, curved prickles are more characteristic of the oldest stems and branches, absent on young stems. Leaflets 5–7, usually 7, suborbicular or ovate, relatively small: 1,5–2,5 cm long and 1,5–2 cm wide, the terminal one the largest, rounded or sharply pointed at the top and rounded at the base. Leaflets yellowish-green or sometimes reddish on young shoots, glabrous or sometimes shortly pubescent, dull shiny above and pubescent with dense sessile, brownish, or translucent, glandular hairs

below. Leaflet margin double–serrate with shortly stipitate glands teeth varying noticeably in size and shape, often 12–18 on each side. Leaves with the strong, characteristic odor of apples are one of the most convenient and simplest identification features because other wild and cultivated Latvian roses do not have such a strong scent. Bracts are rather broad, usually longer than the pedicels. Pedicels short, 1–1,5 cm long, about the same length as fruits – hips, usually with long–petiolate glands.

Flowers solitary or usually with a 3–5 together, deep pink. Sepals are pinnate with prominent lateral lobes, pubescent and glandular, ascending or even erect after blooming, falling somewhat when the fruit ripens. Styles short, lanate, stigmas hispid, in the wedge-shaped head, disc flat or shallowly concave. Hips 1,3–1,8 cm long, subglobose or ellipsoidal, glabrous or ore often with sparse long-stalked glands.

The diversity and forms of prickles and absence or presence of subfoliar glandular hairs were previously used as a taxonomically significant feature, where several intraspecific taxa of *R. rubiginosa* have been distinguished. These taxa were also separated in the oldest herbariums and mentioned as taxonomically significant in the oldest European studies (Christ 1873, Kupffer 1899, Kupffer 1925, Kupffer 1927, Galeniëks 1935, Galeniëks 1957):

- **var. *umbellata* (Leers) Dum.** Prickles unequal, mixed – with broad and with narrow bases. All prickles curved. Leaflets with characteristic subfoliar glands. Most typical infraspecific form close to species description. Relatively most common variety in Latvia.
- **var. *orthacantha* K.R.Kupffer** Prickles unequal, mixed, straight or slightly turned down, long. Variety mentioned in herbaria labels collected in two places in Zemgale region and determined by famous Baltic botanist K. R. Kupfer. Similar plants are not found in recent collections.

- **var. *monacensis* Schnetz.** Prickles unequal leaves without characteristic subfoliar glandular hairs, some glandular hairs only on leaf veins. Pedicels and hips with glandular hairs. Untypical variety, known only from two historical localities, possible with hybridogenic origin. Corresponding material has not been found in the collections of recent years.
- **var. *comosa* Dum.** Prickles equal, straight. Some straight prickles sometimes below the inflorescence. Leaflets with characteristic subfoliar glands. Rare, scattered localities in all territory.
- **var. *silesiaca* Christ.** Prickles equal, straight, leaves without characteristic subfoliar glandular hairs, some glandular hairs only on leaf veins. Pedicels and hips also without glandular hairs. Untypical variety, known only from one historical locality, most believable, with hybridogenic origin. Corresponding material has not been found in the collections of recent years.

The occurrence of the species until 1940 can be considered relatively rare. In this period, the species is known in the herbariums only from 18 squares of the geobotanical grid in the central and western part of the country, also in the scientific literature of this time, the species is marked as rare (Starcs 1925, Galeniēks 1935). The first herbarium for the species was collected in 1894 near Kokenhusen castle ruins by K. Kupfer (Fig. 2). It should be noted that in this period the level of flora research was not comprehensive due to the limited scientific research potential, transport possibilities and fragmentarily preserved scientific collections. In the second stage of Latvian flora research

from 1941 to 1990, as the level of research in the country increased, the species was already known from 96 squares of the geobotanical grid, where the actual findings are even more, as there can be several localities in one geobotanical

square. Galeniēks mentioned five areas, where the species can be found in large numbers:

between Pļaviņas and Aizkraukle, Lielupe dolomites area around Bauska, Vilce – Tērvete area, Auce – Dobele area and the area between Nīca and Rucava (Galenieks 1957), which, considering scientific herbarium of the relevant period, are only partially confirmed. Only one region for the species (around Dobele), where the species can be considered relatively common indicated by I. Riekstiņš (Riekstiņš 1980), while D. Šmite no longer mentions any regions of frequent occurrence of the species (Šmite 1988).

During the re-survey of the largest part of historical localities, it was concluded that the species is no longer found in most of the previously known localities in wild and cultivated places and found only in 44 deposits or in 42 geobotanical grid cells in Latvia (Fig. 3, Tab. 1.).

We found that the number of *Rosa rubiginosa* adults, producing and non-producing individuals in the country does not exceed 350. *Rosa rubiginosa* is highly resistant to drought, salinity, low temperatures, heavy metal pollution, diseases and pests (Hura et al. 2023). The species has also sufficiently specific edaphic requirements as calcareous soils and little shading or sunny light conditions as a typical steppe species. In the central part of the distribution area of *R. rubiginosa*, it grows on stony slopes with steppe vegetation (Tofan–Dorofeev & Ioniņa 2018). In Latvia, such ecological conditions are comparable to extensively managed calcareous grasslands, the area and quality which have significantly decreased in recent decades (Rūsiņa 2017).

Also, it is known that the distribution of the *Rosa rubiginosa* in the regions of intensive agriculture has significantly decreased, while elsewhere in Latvia it has been re-found both in historical localities and in several new localities. Intensive grazing and mowing, as well as afforestation, are not suitable for long-term preservation of localities. Due to specific management requirements in suitable habitats – extensive grazing and mowing, preserving individual shrubs, the species has survived mainly in linear habitats along roads, forest

edges, river banks, powerline routes, hedgerows and other similar places. Semi-natural linear habitats are not only valuable aesthetic features of the landscape but also provide habitats for a variety of wildlife (Spellerberg &

Gaywood 1993). In this case, *R. rubiginosa* has survived in suitable niches, and in managing such places, these natural values should be respected.

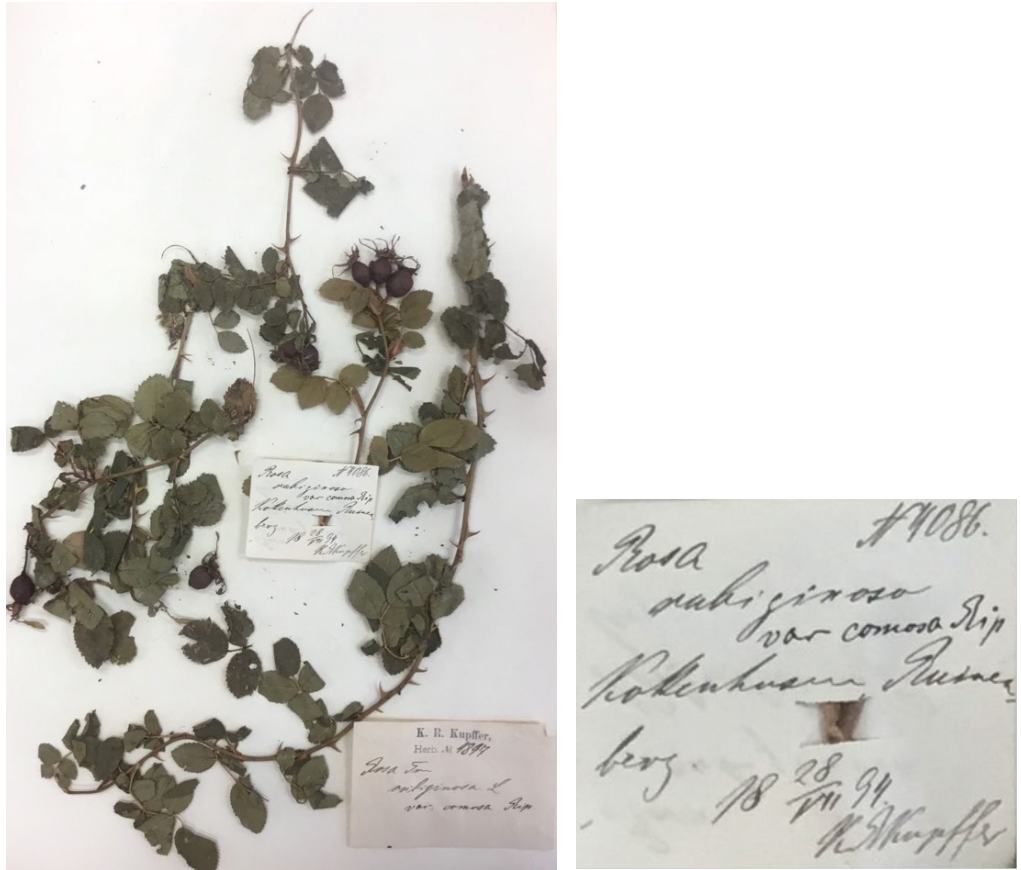


Figure 2. Oldest known herbarium of *Rosa rubiginosa* L. in Latvia stored in Museum of Botany, University of Latvia, collected by K. Kupffer. Specimen (left hand-side) collected in 1894 near Koknese castle ruins (right hand-side). Photo: P. Evarts-Bunders.

Our study results showed that *R. rubiginosa* has a typical dual status – some natural localities and planted for a long time and this species should be considered as ancient anthropophyte. Galeniëks showed that the distribution of *R. rubiginosa* is mostly affected by earlier plantings of this rose, especially around

palaces, churches, and monasteries (Galenieks 1957). Riekstiņš noted that the species should be recognized as autochthonous only in the Daugava Valley and Zemgale plain and that in the rest of Latvia the species is most probably allochthonous (Riekstiņš 1980).

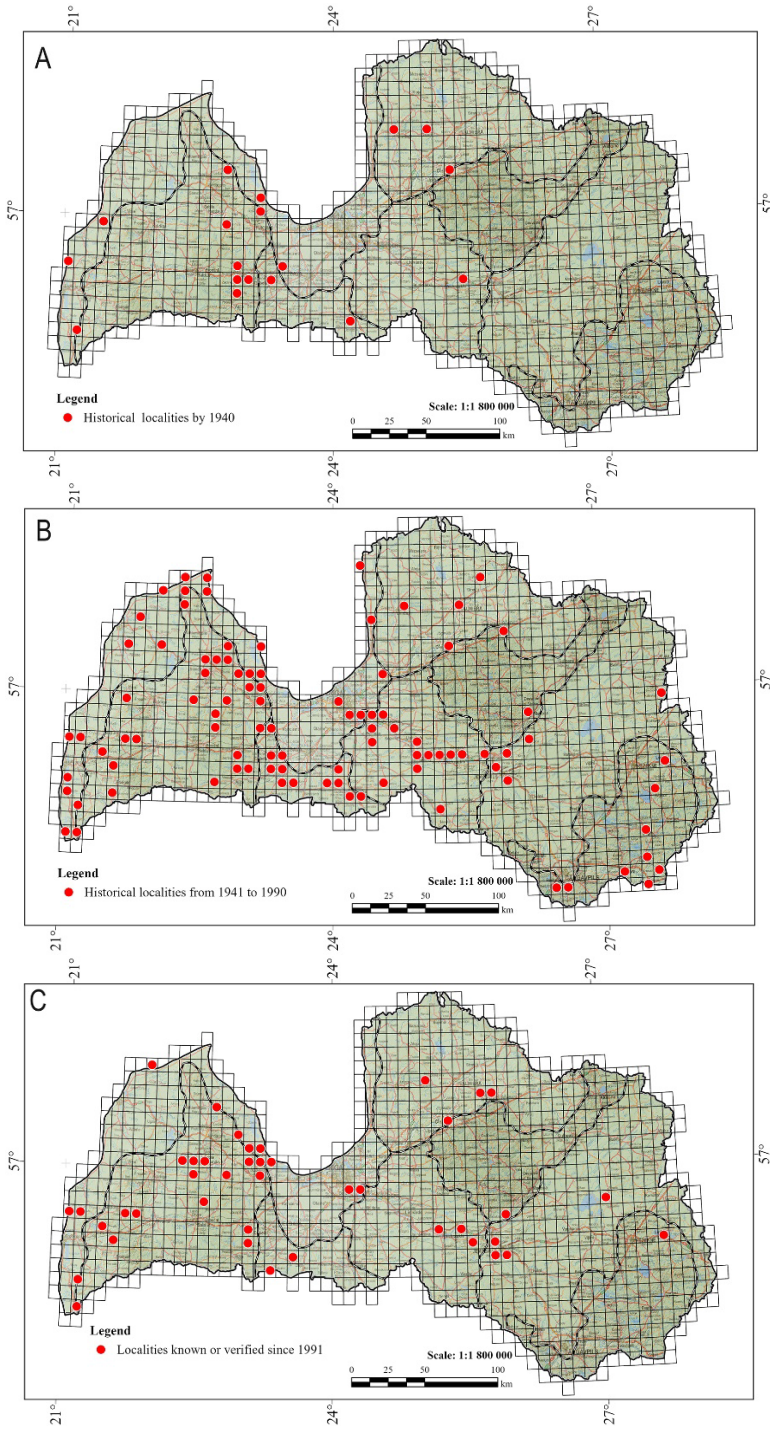


Figure 3. Distribution dynamics of *Rosa rubiginosa* L. in three stages: historical in Latvia localities by 1940 (A), localities from 1940 till 1991 (B), 1991 – till nowadays, according to all available herbarium collections and our studies (C). ©Māris Nitcis.

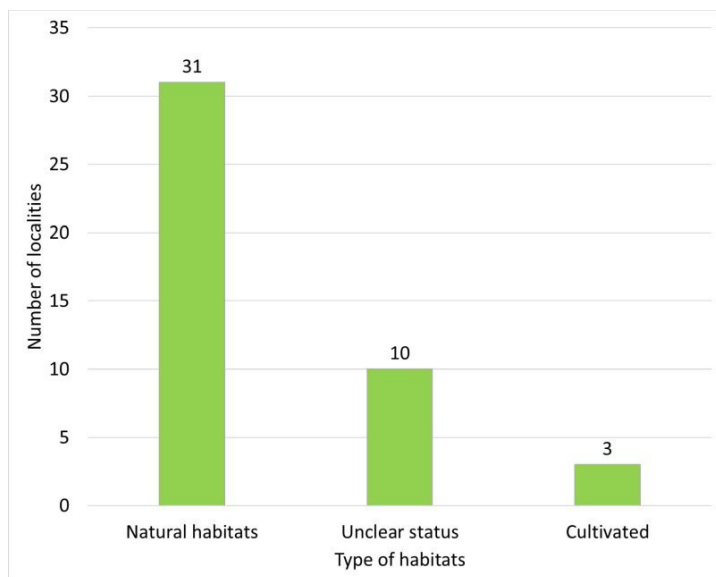


Figure 4. Habitat types of known *Rosa rubiginosa* L. localities in Latvia.

Our results showed that *Rosa rubiginosa* is typical mostly in natural habitats. In total, 70 % of species localities were found in suitable natural habitats – calcareous grasslands, calcareous slopes and roadsides, as well as in dry pine forests, usually on the river banks or the seashore. However, 23 % of species localities were found in habitats with unclear status – disturbed roadsides, surroundings of old manor parks and grasslands, where the species, possibly grow sub-spontaneously. In

addition, *R. rubiginosa* is no longer widely used in culture, and only 7 % of all localities in Latvia are considered anthropogenic – from parks, arboretums, greenery of villages, hedges and other clearly cultivated places. Species may have been planted earlier in parks from the plant material obtained in the wild and also can be naturalize back into natural habitats.

Table 1. Characteristics of *Rosa rubiginosa* localities found in Latvia.

No.	Locality	Habitat	Known from:	Population size	Date of survey, collector, herbarium voucher number
1.	Aizkraukle district, Sece parish, Staburadzes, roadside	Calcareous roadside	HBA, 1980	5	25.08.2023. P. Evarts–Bunders DAU109995
2.	Aizkraukle district, Klintaine parish, Nature reserve ‘Klintaine’	Overgrowing calcareous grassland	HBA,	1	25.08.2023. P. Evarts–Bunders
3.	Aizkraukle district, Sērene parish, 5 km SW from Sērene, farmhouse ‘Lapsas’	Overgrowing calcareous grassland	New	1	18.07.2022. D. Krasnopojska DAU106809

4.	Aizkraukle district, Sērene parish, gravel quarry Saleņieki	Roadside	New	1	04.05.2013. P. Evarts–Bunders DAU31123003
5.	Cēsis city, Liepu street 7, railway embankment	Calcareous slope	L. Eglīte, 2000.	1	23.10.2023. M. Medne DAU110013
6.	Cēsis district, Priekuļi parish, Jaunkalni	Roadside	New	1	13.09.2020. M. Medne DAU104313
7.	Cēsis district, Priekuļi parish, Nature reserve ‘Kazu grava’	Calcareous shrubland on limestone	HBA, 1972	5	29.09. 2023. A. Pošiva–Bunkovska
8.	Dienvidkurzeme district, Kazdanga parish, Valāta, Bērzu street 3	Roadside	HBA, 1972	3	06.08.2023 P. Evarts–Bunders DAU110000
9.	Dienvidkurzeme district, Nīca parish, road Bētiņciems– Ječi	Roadside	Riekstiņš HBA, 1972	1	23.09.2011. M. Medne DAU31123001
10.	Dienvidkurzeme district, Nīca parish, Road Peši – Ječi	Roadside	Kupffer, RIG, 1899	1	23.09.2011. M. Medne DAU31123002
11.	Dienvidkurzeme district, Nīca parish, 3 km S from Ječi	Roadside	Kupffer, RIG, 1899	1	30.07.2021. D. Krasnopoļska DAU107578
12.	Dienvidkurzeme district, Vecpils parish, former Rasūte manor site	Roadside	HBA, 1983	2	06.08.2023. P. Evarts–Bunders DAU109998
13.	Dienvidkurzeme district, Vērgale parish, Ziemupe, near house ‘Vasarnieki 20’	Juniper and heather groves	Laksewitz, RIG, 1900	5	09.09. 2022. A. Priede DAU107304
14.	Dienvidkurzeme district, Rucava parish, Rucava manor hill, near arboretum	Calcareous slope	HBA, 2014	20	06.08.2023. P. Evarts–Bunders DAU110001
15.	Dobele district, Annenieki parish farmhouse ‘Čankas’	Calcareous grassland, roadside	RIG, 1933	4	22.10.2023. M. Medne DAU110015
16.	Dobele district, Augstkalne parish, farmhouse ‘Skujiņas’, bank of Svēte river	Dry pine forest	HBA, 1976	20	22.08.2021. P. Evarts–Bunders DAU106086
17.	Dobele district, Bēne parish, farmhouse ‘Čiekuri’	Roadside	HBA, 1977	6	21.08.2021. P. Evarts–Bunders DAU106051
18.	Dobele district, Biksti parish, Lūku mound	Calcareous shrubland	RIG, 1936	10	22.10.2023. M. Medne DAU110016
19.	Jēkabpils district, Ābeļi parish, Ābeļi, Gārduņu street	Dry disturbed pine forest	LATV, 1995	1	06.09.2021. G. Evarte–Bundere DAU106006
20.	Jēkabpils district, Jēkabpils, near the Radžu reservoir	Calcareous grassland	E. Lehmann, 1895	5	19.06.2022. G. Evarte–Bundere
21.	Jēkabpils district, Krustpils, near Donaviņa river	Riverbank	New	1	03.08.2022. G. Evarte–Bundere DAU108280
22.	Jēkabpils district, Krustpils, Rīgas street.	Calcareous slope, roadside	E. Lehmann, 1895	2	19.06.2022. G. Evarte–Bundere DAU106010
23.	Jelgava district, Vīlec parish, Mazvilce	Roadside	HBA, 1977	8	22.08.2021. P. Evarts–Bunders DAU106087
24.	Kuldīga district, Laidi parish, Valtaiki, farmrouse ‘Lapiņas’	Old park fragments	HBA, 1978	1	08.06.2023. P. Evarts–Bunders DAU109999

25.	Limbaži district, Umurga parish, Lauvaskalns	Overgrowing calcareous grassland	RIG, 1938	10	23.10.2023. M. Medne DAU110017
26.	Ludza district, Ludza, Runtorta, Gaismas street 16	Roadside, calcareous slope	HBA, 1979	3	06.09.2023. G. Evarts–Bundere DAU109994
27.	Madona district, Kalsnava parish, Arboretum Kalsnava	Cultivated	Planted in 2012	3	25.10.2023, L. Opincāne
28.	Rēkeke district, Gaigalava parish, Leigauņu bog, Leigauņu mineral soil island	Grassland, cultivated	New	2	10.07.2020. I. Kukāre DAU104474
29.	Talsi district, Lauciena parish, farmhouse 'Klinti'	Dry pine forest	HBA	1	11.09.2021. P. Evarts–Bunders
30.	Talsi district, Lībagi parish, Čumalas	Calcareous grassland	New	1	02.08.2021. P. Evarts–Bunders DAU106154
31.	Talsu district, Balgale parish, Dursupe, near orchard	Roadside	HBA, 1977	100	11.09. 2021. P. Evarts–Bunders DAU106359
32.	Talsu district, Lauciena parish, Fridriķmuiža	Roadside	HBA, 1977	1	11.09. 2021. P. Evarts–Bunders DAU106361
33.	Talsu district, Ģibuļi parish, Veģi, farmhouse 'Gailīši'	Calcareous pasture	New	25	04.07.2020 A. Bojāre
34.	Tukums district, Engure parish, road Kalnupe – Čiekuri	Dry pine forest, roadside	New	1	22.10.2023 M.Medne DAU110012
35.	Tukums district, Sēme parish, Plieņi, school	Roadside	Rothert, RIG, 1907	20	10.09.2021. P. Evarts–Bunders DAU106384
36.	Tukums district, Sēme parish, Plieņi, farmhouse 'Zaļmeži'	Calcareous grassland	HBA, 1977	10	10.09.2021. P. Evarts–Bunders DAU106386
37.	Tukums district, Sēme parish, Rideļi	Roadside	New	1	22.10.2023 M.Medne DAU110014
38.	Tukums district, Smārde parish, Cērkste, farmhouse 'Jaunratnieki'	Roadside, slope	HBA, 1977	5	10.09.2021. P. Evarts–Bunders DAU106353
39.	Tukums district, Smārde parish, farmhouse 'Apsītes'	Roadside, calcareous slope	New	30	10.09.2021. P. Evarts–Bunders DAU106384
40.	Tukums district, Smārde parish, Rauda, farmhouse 'Rītiņi'	Roadside	New	1	23.07.2022. M. Kalniņš DAU107984
41.	Tukums district, Tume parish, Vecmokas	Overgrowing calcareous grassland, roadside	Riekstiņš, HBA, 1972	5	10.09.2021. A. Bojāre DAU106374
42.	Tukums district, Zemīte parish, near Zemīte manor	roadside, calcareous grassland	RIG, 1933	2	22.10.2023. M.Medne DAU110011
43.	Tukums district, Zentene parish, Brizule, farmhouse 'Stīļi'	Overgrowing calcareous grassland	LATV, 1999	5	10.09.2021. A. Bojāre DAU106383
44.	Ventspils district, Tārgale parish, Miķeļtornis, N from a lighthouse	Dune forest	HBA, 1976	3	13.08. 2023. P. Evarts–Bunders DAU109997

CONCLUSIONS

We conclude that *R. rubiginosa* is a species with a decreasing frequency of occurrence in Latvia and was found in only 44 sites in recent years, which is significantly less than previously based on historical data. Evaluating the size of the detected populations in the country, we found that the number of adults, producing and non-producing individuals in the country does not exceed 350. Therefore, the population of the species in Latvia is considered endangered, and its inclusion in the registers of rare and protected species is justified.

Rosa rubiginosa is found mainly in calcareous grasslands and slopes. As natural vegetation disappears because of intensive agriculture as well as overgrowth of suitable habitats, *R. rubiginosa* is pushed to various contact areas. Most often these are roadsides, which in most cases are also considered natural vegetation, because the shrubs along the roadsides are not cultivated or escaped from plantings, parks, or greeneries. The distribution of the species is largely confined to river valleys and dry slopes on riverbanks. From the regions of frequent occurrence of the species defined in earlier studies, it is no longer found massively in any of them. *Rosa rubiginosa* can be considered relatively more common only in the Northern part of Tukums region. In all other established localities and earlier regions of frequent occurrences, such as in the middle part of the Daugava Valley between Pļaviņas and Koknese, in the region between Nīca and Rucava, or the region around Dobeles, the species is found in scattered populations as rare specimens.

In general, 70% of the known localities are considered natural, while the origin of another 23% of deposits cannot be reliably determined, because there are potential introduction sites nearby, or the plantations form regular rows or shapes. Only 7% of *R. rubiginosa* deposits are of anthropogenic origin – parks or fragments of uncultivated parks, arboretums and hedges. However, we cannot exclude the possibility that *R. rubiginosa* in the parks may

come from the natural origin, taking the seedling material from the wild.

ACKNOWLEDGEMENTS

We are grateful to all the specialists and curators for the kind permission to work with all used herbarium collections in Latvia. We would like to express gratitude to all, who have contributed to the collection of the *Rosa* herbarium material – D. Krasnopoļska, (Daugavpils University, Latvia) I. Kukāre, M. Kalniņš (Joint Stock Company "Latvia's State Forests" and A. Priede (Nature Conservation Agency, Latvia). Thanks to M. Nitcis (Daugavpils University, Latvia) for assistance with the cartographic material. We are also grateful to the reviewers for their valuable comments that helped to improve the paper. The work is supported by Daugavpils University project "Taxonomical and chronological studies on rare and autochthonous species of genus *Rosa* L. in Latvia." (Nr. 14–95/2022/4).

REFERENCES

- Cinovskis R. 1979. Latvijas PSR ieteicamo krāšņumaugu sortiments. Koki un krūmi. Zinātne, Rīga. 276 pp.
- Cinovskis R., Janele I., Skujniece I., Zvirgzds, A. 1974. Koki un krūmi Latvijas lauku parkos. Zinātne, Rīga. 348 pp.
- Christ H. 1873. Die Rosen der Schweiz mit Berücksichtigung der umliegenden Gebiete Mittel- und Süd-Europa's. Basel, H. Georg's verlag, 219 S.
- Tofan–Dorofeev E., Ionița O. 2018. The diversity of *Rosa* L. species of the steppe habitat in the Republic of Moldova. *Journal of Botany* 10(16): 46–49.
- Fischer J.B. 1778. Versuch einer Naturgeschichte von Livland. Leipzig, 414 S

- Fleischer J.G., Lindemann E. 1839. Flora der deutschen Ostseeprovinzen Esth-, Liv- und Kurland. –Mitau, Leipzig: Verlag von G. A. Reyher. 390 S.
- Friebe W. 1805. Flora für Liefland, Ehstland und Kurland. Hartmann Buchhandlung, Riga. 392 S
- Galenieks P. 1935. Latvijas rozēs. Doktora disertācija. Latvijas universitāte, Rīga. 114 pp.
- Galenieks P. 1957. *Rosa* L. – In: Latvijas PSR flora. (P. Galenieks atb. red.). 3. sējums. Latvijas Valsts izdevniecība, Rīga. Pp. 108–122.
- Graham G.G., Primavesi A.L. 1993. Roses of Great Britain and Ireland. BSBI handbook, London. 208 pp.
- Hultén E., Fries M. 1986. Atlas of North European Vascular Plants: North of the Tropic of Cancer. Vol. 2. Koeltz Scientific Books, Königstein. 541 pp.
- Hura T., Hura K., Ostrowska A., Gadzinowska J., Urban K., Pawłowska B. 2023. The role of invasive plant species in drought resilience in agriculture: the case of sweet briar (*Rosa rubiginosa* L.). *Journal of Experimental Botany* 74(9): 2799–2810. <https://doi.org/10.1093/jxb/erac377>
- Kláštorský I. 1968. *Rosa* L. In: Tutin, T.G. & al. (eds.) *Flora Europaea*. Cambridge University Press. 2: 25– 32.
- Klinge J. 1882. Flora von Est-, Liv- und Curland. Dorpat: C. Mattiesen. 664 S.
- Klinge J. 1883. Holzgewächse von Est-, Liv- und Curland. Dorpat: Verlag von C. Mattiesen. 290 S.
- Kukk T., Kull T., Luu O., Mesipuu M., Saar P. 2020. Eeesti taimede levikuatlas 2020 (Atlas of the Estonian flora 2020). Estonian Seminatural Community Conservation Association, Tartu. 643 pp. (In Estonian; abstract in English).
- Kupffer K.R. 1899. Beitrag zur Kenntnis der Gefäßpflanzenflora Kurlands –In: Korrespondenzblatt des Naturforscher-Vereins zu Riga. Druck von W.F. Häcker, Bd. 42. – 100–140 S.
- Kupffer K.R. 1925. Grundzüge der Pflanzengeographie des Ostbaltischen Gebietes. Abhandlungen des Herder-Instituts zu Riga – Riga: G. Löffler, Bd. 1, N 6, 224 S.
- Kupffer K.R. 1927. Floristische Notizen über Ostbaltische Gefäßpflanzen –In: Korrespondenzblatt des Naturforscher-Vereins zu Riga. Bd. 59. S. 181–203.
- Kurtto A., Lampinen R., Junikka L. (eds.) 2004. *Atlas Florae Europaeae*. Distribution of Vascular Plants in Europe. 13. Rosaceae (*Spiraea* to *Fragaria*, excl. *Rubus*). The Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki. Pp. 104–106.
- Laiviņš M., Krampis I., Šmite D., Bice M., Knape, Dz., Šulcs V. 2009. Latvijas kokaugu atlants (Atlas of Latvia woody plants). SIA apgāds mantojums, Rīga. 608 pp. (In Latvian; abstract in English).
- Lehmann E. 1895. Flora von Polnisch-Livland mit besonderer Berücksichtigung der Florengebiete Nordwest-Russlands, des Ostbalticums, der Gouvernements Pskow und St. Petersburg sowie der Verbreitung der Pflanzen durch Eisenbahnen. Jurjew, Dorpat. 432 S.
- Navasaitis M., Ozolinčius R., Smaliukas D., Balevičiene J. 2003. Lietuvos dendroflora. Lutute, Kaunas. 576 pp.

- Riekstiņš I. 1977. Issledovanie fitogeograficheskogo rasprostraneniya dikih vidov roda *Rosa* L. pri ocenke ih resursov v Latvijskoi SSR (Study of the phytogeographical distribution of wild species of *Rosa* L. in relation to their resources in Latvian SSR. In: Ozoliņš V. (ed.). Botanicheskiye sady Pribaltiki. Ohrana rastenij. Zinātne, Rīga. Pp. 72–93. (In Russian).
- Riekstiņš I. 1980. Savvaļas rozes. Zinātne, Rīga. 82 pp.
- Rūsiņa S. (ed.) 2017. Aizsargājamo biotopu saglabāšanās vadlīnijas Latvijā. 3. sējums. Dabiskās pļavas un ganības. Dabas aizsardzības pārvalde, Sigulda. 432 pp.
- Šmite D. 1977. ZA botāniskajā dārzā kultivēto savvaļas rožu konspekts. 1. ziņojums. In: Daiļdārzniecība. Zinātne, Rīga. 11: 31–39.
- Šmite, D. 1986. ZA botāniskajā dārzā kultivēto savvaļas rožu sugu konspekts. 2. ziņojums. In: *Daiļdārzniecība*. 13: 44–5.
- Šmite D. 1988. Dikorastushchie i introducirovannye vidy roda *Rosa* L. V Pribaltike (Decorative and introduced species of genus *Rosa* L. in Baltics). Dissertation. University of Latvia, Riga. 190 pp. (In Russian).
- Šmite D. 2003. *Rosa rubiginosa* L. – In: Andrušaitis, G. (red.). Latvijas Sarkanā grāmata. Vaskulārie augi, 3. sēj. Latvijas Universitātes Bioloģijas institūts, Rīga. Pp. 604–605.
- Šmite D. 1996. *Rosa* L. In: Kuusk V., Tabaka, L., Jankevičiene, R., (eds.). Flora of the Baltic countries, Tallin. Pp 45–64.
- Spellerberg I. F., Gaywood M. K. 1993. Linear features: linear habitats and wildlife corridors. English Nature Research Report 60. University of Southampton, Southampton. 22 pp.
- Starcs K. 1925. Koku un krūmu noteicējs. Rīga: Mežu departamenta izdevums. Pp. 250–252.
- Väre H., Saarinen J., Kurto J., Hämet–Ahti L. 2021. Suomen puu– ja pensaskasvio. 3–rd ed. Helsinki, Dendrologian seura. 550 pp.
- Wiedemann F.J., Weber E. 1852. Beschreibung der phanerogamischen Gewächse Esth–, Liv– und Curlands. –Reval: F.Kluge, 664 S.
- Weber E. 2003. Invasive plant species of the world. A reference guide to environmental weeds. CABI, Cambridge. 548 pp.
- Zieliński J. 1985. Studia nad rodzajem *Rosa* L. Systematika sekcii *Caninae* DC. em. Chist. In: Arboterum Kornickie. Rocznik. 30: 109 s.

Received: 09.11.2023.

Accepted: 14.12.2023.