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Occurrence of the red-leaved rose *Rosa glauca* Pourr. (Rosaceae) in Poland

Introduction

The red-leaved rose, *Rosa glauca* Pourr., is a mountain species endemic to Europe, found in its southern, western and central areas. Its original range included the Pyrenees, the Alps, the Vosges, the Swabian Jura, the Carpathians, the Apennines and the mountains of the Balkan Peninsula (Zieliński, 1987; Popek, 2007; Khapugin et al., 2021). In addition, it is cultivated and feral in Poland, Germany, the Netherlands, Great Britain, Lithuania, Latvia, Estonia, Belarus, Ukraine, Russia, Moldova, Scandinavian countries, the United States and Canada (Tutin et al., 1968; Zieliński, 1987; Popek, 2007; Khapugin et al., 2021; *Global Biodiversity Information Facility*, 2022). *R. glauca* was introduced to Poland in 1817. From cultivation, it began to mainly penetrate anthropogenic habitats and communities. It has now been granted the status of a non-invasive kenophyte, permanently established in the national flora (Tokarska-Guzik et al., 2012).

There is practically no information on the distribution of this species in the national botanical literature. This is most likely due to the fact, that its localities, apart from cultivation in botanical gardens or arboreturns, are not very numerous. Zieliński (1987) reported it as a frequently cultivated species in many places, especially in the west of Poland where it may have appeared as an escapee from cultivation. Its closest natural sites are in the mountains near Bielsko in Slovakia (Zieliński, 1987).

Hybrids of the native species *Rosa pendulina* L. with *R. dumalis* Becht or with *R. canina* L. may be mistaken with *R. glauca* (Zieliński, 1987). Characteristic features of this rose are glaucous leaves with a purplish bloom, red-brown bark, and curved or declined prickles, subulate. Leaflets 5–7(–9) have blades narrowly elliptic to ovate, leathery, margins 1–serrate, eglandular or few gland-tipped, glaucous, dull, glabrous. Inflorescences are 1–5-flowered. Pedicels are glabrous, stipitate-glandular. Flowers have 2–3 cm diameter (Fig. 1).



Fig. 1. Flower of red-leaved rose *Rosa glauca* Pourr. (Photo. W. Gruszkza, Motylewo village, 2022)

Petals are single, with color from deep pink to crimson-red, sometimes white basally, styles exsert 1–2 mm beyond stylar orifice (1.5–2 mm diameter) of hypanthial disc (3 mm diameter). Hypanthium is narrowly ovoid, glabrous, glandular or eglandular, neck purplish, sepals spreading, lanceolate, margins entire, and sometimes pinnatifid. Hips are dark brownish red to crimson red, globose, ovoid, or obovoid. Sepals deciduous as hips mature, erect to spreading (Popek, 2007; Lewis et al., 2014; Fig. 2). It is a tall shrub reaching 2–3 m in height, with erect purple-colored shoots, without or only with very short stolons (Seneta, Dolatowski, 2004; Fig. 3).

In 2021, during field research carried out in the vicinity of Gorzów Wielkopolski, the authors came across a site (AC6672 square) where *R. glauca* was growing in a cluster of approximately 30 m². This finding provided the impetus to undertake this research study, which was aimed at presenting all the currently identified *R. glauca* sites in Poland and determining its ability to establish and spread.

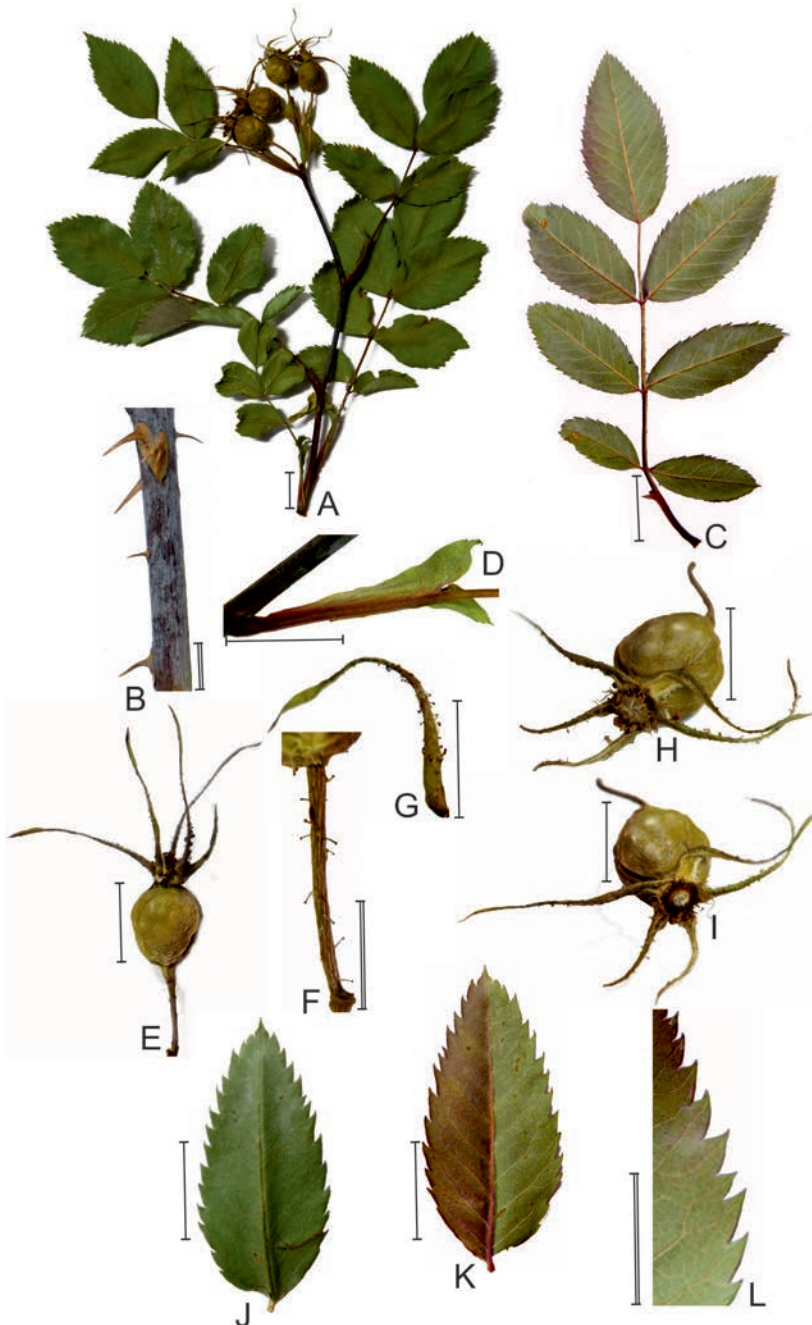


Fig. 2. Red-leaved rose *Rosa glauca* Pourr. (Photo. 2022. A. Sołtys-Lelek, specimen from Poland, Motylewo, 2022, W. Gruszka)

Part of a fruiting short shoot - A; Part of a long shoot - B; Leaf - C; Stipule - D; Fruit with glandular sepals - E; Glandular petiole - F; The top part of the hypanthium - H, I; Leaflet - J,K; Leaf margin - L.; Solid bar = 1 cm. Double bar = 0.5 cm



Fig. 3. Red-leaved rose *Rosa glauca* Pourr. (Photo. W. Gruszcza, Motylewo village, 2022)

Materials and methods

In order to explore discover the distribution of spontaneous localities of *Rosa glauca* in Poland, the authors, in addition to their own observations, verified collections gathered in the herbaria of national universities. Specimens were found in: University of Silesia in Katowice (KTU), Maria Curie-Skłodowska University (LBL), Institute of Biology, Faculty of Exact and Natural Sciences, Wrocław University (WRSL), University of Warsaw (WA), Jagiellonian University (KRA), W. Szafer Institute of Botany, Polish Academy of Sciences (KRAM), Adam Mickiewicz University (POZ), Forest Research Institute (BIL) Institute of Dendrology (KOR). Data published in the available literature were also taken into account. All the collected data are included on the map (Fig. 4).

In the list of sites and on the distribution map, only sites that arose spontaneously or those that are remnants of former cultivation (feral) are included. Sites in private collections, botanical gardens, arboretums, etc. were not included. These sites were located within 10 km of ATPOL square (Zajęc, Zajęc, 2001) and the nearest village.

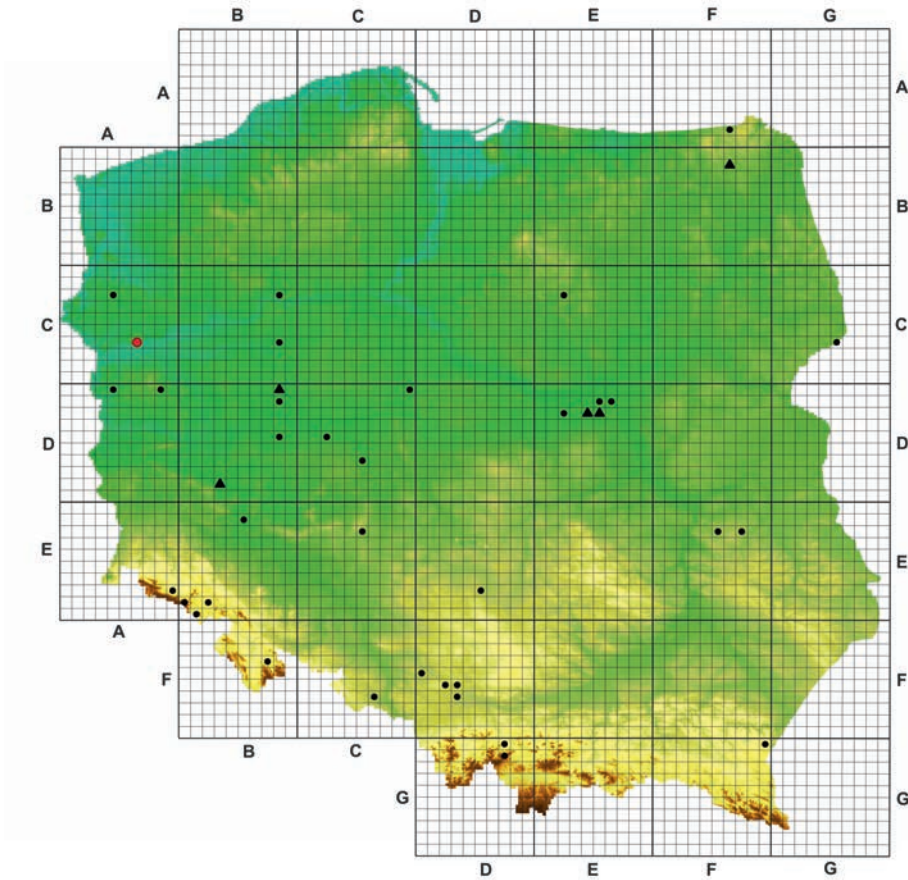


Fig. 4. Current distribution of *Rosa glauca* Pourr. in Poland on the ATPOL grid square system.
 Explanation of symbols: ● – squares in which single stands of the species were reported; ● – new stand found by the authors; ▲ – squares in which two stands of the species were reported'

Glossary of geographical names in the study

This list includes the geographical coordinates for the villages in the article:

- Bakałarzewo 54°05'30"N; 22°39'17"E (FB16)
- Białka 49°41'36"N; 19°40'21"E (DG07)
- Białowieża 52°42'02"N; 23°52'00"E (GC65)
- Bojszowy 50°03'25"N; 19°06'03"E (DF63)
- Borawskie 54°05'58"N; 22°37'48"E (FB16)
- Dębówka 52°11'14"N; 20°20'51"E (ED22)
- Gołuchów 51°50'55"N; 17°55'50"E (CD65)
- Huwniki 49°39'20"N; 22°42'14"E (FG09)
- Kamienna Góra 50°46'59"N; 16°01'59"E (BE82)

Kępno 51°16'42"N; 17°59'16"E (CE25)
Kłęka 52°04'32"N; 17°25'18"E (CD42)
Kowary 50°47'27"N; 15°50'14"E (BE80)
Lubawka 50°42'09"N; 15°59'57"E (BE91)
Lublin 51°14'42"N; 22°34'00"E (FE27)
Luboń 52°20'38"N; 16°52'35"E (BD08)
Motylewo 52°40'56"N; 15°03'06"E (AC66)
Nałęczów 51°17'19"N; 22°12'49"E (FE25)
Orzeszków 51°24'02"N; 16°30'25"E (BE15)
Ożarów Mazowiecki 52°12'37"N; 20°47'56"E (ED25)
Paclaw 49°37'31"N; 22°42'24"E (FG09)
Parkowo 52°42'13"N; 16°54'59"E (BC68)
Pawłów 50°06'39"N; 18°07'43"E (CF66)
Piaseczno 53°03'40"N 14°41'59"E (AC24)
Piaśtów 52°11'02"N; 20°50'24"E (ED25)
Piła 53°08'31"N 16°45'44"E (BC28)
Pogroszew 52°13'48"N; 20°44'34"E (ED24)
Poznań 52°24'52"N; 16°55'16"E (BD08)
Puszczkowo 52°16'58"N; 16°50'54"E (BD18)
Radonice 52°10'15"N; 20°36'41"E (ED24)
Rzeki Wielkie 50°52'36"N; 19°23'19"E (DE75)
Rzepin 52°20'44"N; 14°49'48"E (AD04)
Sompolno 52°23'17"N; 18°30'09"E (CD09)
Szczyglice 51°37'47"N; 16°07'32"E (BD83)
Sieraków 52°18'44"N; 20°48'47"E (ED15)
Stańczyki 54°17'31"N; 22°39'12"E (FA86)
Staropole 52°20'44"N; 15°26'40"E (AD08)
Stojków 50°19'13"N; 16°53'14"E (BF37)
Szydłowo 53°04'47"N; 20°26'54"E EC22
Turew 52°03'32"N; 16°49'38"E (BD48)
Tychy 50°07'34"N; 19°00'30"E (DF53)
Warszawa 52°14'32"N; 21°01'02"E (ED26)
Wyry 50°07'33"N; 18°53'27"E (DF52)
Zachełmie 50°49'32"N; 15°39'39"E (AE79)
Zawoja 49°40'04"N; 19°34'55"E (DG17)
Żernica 50°14'47"N; 18°36'56"E (DF40)

Results

Unpublished sites in the ATPOL grid squares

- AC6672: village of Motylewo near Bogdaniec, roadside of voivodeship road 132, 2021, leg. W. Gruszka
- AE79: Karkonosze, Zachełmie, on the northern slope of Kopa, 1982, A. Boratyński (KOR029803, KOR029804, KOR029805)
- BD08: Luboń, Wielkopolska National Park, edge of willow scrub, 1977, M. Ratajczak (POZ-V-0089053)
- BD18: Puszczykowo, on the Warta River Wielkopolska National Park, 2004, A Purcel (KOR027974, KOR027975)
- BD83: Szczyglice, Głogów municipality, in roadside ditch 1973, E. Kozioł (WRSL 32303)
- BD83: Krzepów, city of Głogów, in scrubland. 1973, E. Kozioł (KRAM 264848, POZ-V-0089469)
- BE15: south side of road from Małoiwce to Orzeszków, near Ścinawa, roadside ditch. 1961 K. Borowicz (KOR027976, KOR027977)
- BE80: Karkonosze, Kowarska Pass, 1982, A. Boratyński (KOR027983, KOR027984, KOR027985)
- BE82: Kamienne Mountains, Sadowa Góra, 1982, A. Boratyński (KOR027991, KOR027992 KOR027993, KOR027696, KOR027970, KOR027971, KOR027972)
- BE91: Krucze Mountains near Lubawka, on rocks, 1982, A. Boratyński (KOR027988, KOR027989, KOR027990)
- BF37: Łądek, Stojków, Złote Mountains, Biała Łądecka Valley, roadside, scrub, near railroad tracks. P. Kosiński (KOR027973)
- CD42: Klęka, Nowe Miasto municipality, by the road to Książ, 1995, A. Czarna (POZ-V-0089052)
- CD65: Gołuchów, commune. Gołuchów, on the outskirts of the palace in palace park, 2000, A. Czarna (POZ-V-0089050)
- CE25: Kepno, by road south of the village, 1934, F. Krawiec (POZ-V-0089055)
- CF66: Pawłów district of Racibórz, palace park, 1963 (KRA 0138864)
- DE75: Rzeki Wielkie, remnant of a park, 1978, T. Muras, (KTU 022280)
- DG07: Białka near Maków Podhalański, on the road to Zawoja (and Zubrzyca), 2004, W. Bartoszek (KRA 0260719, KRA 0260718, KRA 0260714, KRA 0260720, KRA 0260721)
- DG17: Zawoja, roadside, 1984, A. Mach, (KTU 144448)
- EC22: between Szydłowo a Kluszewo, east of Mława, scrubby roadside 1980, J. Zieliński (KOR027965, KOR027966)
- ED15: Sieraków, roadside, 1970, K. Nowak (WA 0000092957)
- ED16: Warsaw Młociny, edge of the forest, 1978, K. Wichowicz (WA 0000092956)

- ED22: Dębówka, ditch, 1968, K. Nowak (WA 0000092960, WA 0000092961, WA 0000092963, WA 0000092967)
- ED24: Pogroszew, ditch, 1967, K. Nowak (WA 0000092965)
- ED24: Radonice, buttress, 1968, K. Nowak (WA 0000092968)
- ED25: Ożarówek, roadside fence, 1968, K. Nowak (WA 0000092962, WA 0000092966)
- ED25: Piastów, buttress, 1968, K. Nowak (WA 0000092964)
- FA86: village of Stańczyki, municipality of Gubieniki, scrub on a roadside escarpment near the ruins of an old farmhouse, 2010, A. Pliszko (KRA 0417638, KRA 0417637)
- FB16: Bakalarzewo village, edge of pine forest, 2011, A. Pliszko (KRA 0419605, KRA 0419606, KRA 0419607)
- FB16: village of Borawskie, municipality of Olecko, edge of the forest near the ruins of an old farmhouse, 2009, A. Pliszko (KRA 0417665, KRA 0417664, KRA 0417663)
- FE25: Nałęczów, 1959, M. Strasburger (WA 0000092954, WA 0000092955)
- FE27: Lublin, by the street in a hawthorn hedge, 1978, W. Kraczek (LBL, no specimen number)
- GC65: Białowieża, Polana Białowieska near PTTK building, 1973, A. Sokolowski (BIL 57199), 1971 (BIL 46622, 46623)

Published sites in the ATPOL grid squares

- AC24: vicinity of Piaseczno village (Startek et al., 2020)
- AD04: beaches between Rzepin and Boczow (Zieliński, 1976, KRAM 408818, KOR027964)
- AD08: between Staropol and Wysoka, feral in the area of the old park (Zieliński, 1976, KRAM 408819, KOR 077986, KOR 077987)
- BC28: Piła; a cultivated specimen running wild (Sołtys-Lelek, Gruszka, 2016)
- BC68: Parkowo near Oborniki (Stefanek, 1984, KOR027978; KOR027979; KOR027980, KOR027981; KOR027982)
- BD08: Poznań, Rusałka Lake area (Dyderski et al., 2016)
- BD48: Turew, Kościan municipality, in the manor park (Czarna, 2009, POZ-V-0089051)
- CD09: Sompolno, old cementary (Czarna, 2016)
- DF40: north of Żernica, scrub on roadside (Urbisz, 2021) (KTU 0124309)
- DF52: Wiry, near the former State Farm (Urbisz, 2021) (KTU 0124308)
- DF53: Tychy (Urbisz, 2021)
- DF63: Bojszowy (Urbisz, 2021)
- FG09: Chyb Mountain in Huwniki, Ubocz wilderness in Paclaw (Piórecki, 2013)

Discussion

Rosa glauca has the status of an established, non-invasive kenophyte species in Poland (Tokarska-Guzik et al., 2012). In the 1970s, it was reported to be commonly cultivated (Kościelny, Sękowski, 1971). Since the second half of the 20th century, there have been reports in the literature of its spontaneous, sporadic spread from cultivated areas, especially in the west of the country (Zieliński, 1987).

R. glauca, as an escapee from cultivation, is a rare species in Poland. A total of 45 sites have been identified, where *R. glauca* grows; all of which were either spontaneously established or are remnants of former cultivation. The sites are located in 40 quadrants of the ATPOL grid (Fig. 4). Its current range covers the entire country, although it seems to be more frequent in the western portion of the country. This confirms the literature data, which stated that the species was cultivated and wild mainly in the western part of Poland (Zieliński, 1987). However, it can be assumed that the distribution image of this species in Poland is probably affected by the insufficient state of field research. Therefore, the list of sites presented in the publication can be expected to be supplemented in the future.

The spread of this species in the country may be favored by its wide tolerance, both with regard to climatic and habitat conditions. It can tolerate frost down to -42.8°C (USDA zone 2a). It has no special soil requirements. But, it does require a plenty of sunshine although it can tolerate sites in partial shade.

R. glauca is a species penetrating plant communities and developing on anthropogenic habitats, i.e. habitats created by humans, semi-natural communities, or communities/habitats partly transformed. Its spread may be aided by birds, such as jays (Lewis et al., 2014).

This rose has been listed as an alien species in Poland. Although its possible negative impacts on native species of flora or on other elements of the habitats in which it grows, has not yet been thoroughly studied. However, such an impact cannot be ruled out in the future, because in the case of many species of foreign origin their invasive behavior becomes delayed (lag phase) (Hobbs, Humpheries, 1995; Richardson, Pyšek, 2006). Therefore, it is important to know the current distribution of spontaneously established populations of this species and, in the long run, undertake research aimed at determining its impact on native floral elements.

In addition, it has been proven that the species tends to hybridise with other rose species spontaneously, including native species. It forms spontaneous hybrids with *Rosa dumalis*, *R. pendulina*, *R. spinosissima* and *R. gallica* (Szafer, 1935; Szafer et al., 1986). Thus, it may pose a potential threat to native floral elements by being able to hybridise with domestic rose taxa.

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Conflict of interest

The authors declare no conflict of interest related to this article.

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Abstract

The red-leaved rose, *Rosa glauca*, has the status of an established, non-invasive kenophyte species in Poland. In the 1970s, it was reported to be commonly cultivated, and since the second half of the 20th century, information about its spontaneous spread, mainly in the western part of the country, has appeared in the literature. The aim of this study was to present the current distribution of *Rosa glauca* sites in Poland. The possible invasive potential of this species was also studied.

Key words: Rosaceae, distribution of stands, invasive potential, kenophyte

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Występowanie róży czerwonawej *Rosa glauca* Pourr. (Rosaceae), w Polsce

Streszczenie

Rosa czerwonawa *Rosa glauca* Pourr. jest gatunkiem górskim, endemicznym dla Europy. Jej pierwotny zasięg obejmował Pireneje, Alpy, Wogezy, Jurę Szwabską, Karpaty, Apeniny oraz góry Półwyspu Bałkańskiego (Zieliński, 1987; Popek, 2007; Khapugin i in., 2021). *R. glauca* została sprowadzona do Polski w 1817 roku. Z uprawy zaczęła przenikać głównie w siedliska i zbiorowiska antropogeniczne. Obecnie uzyskała status nieinwazyjnego kenofita, trwale zdomowionego we rodzimej florze (Tokarska-Guzik i in., 2012). W bibliografii krajowej nie ma wiele informacji na temat rozmieszczenia tego gatunku. Dlatego autorzy niniejszej pracy w celu określenia rozmieszczenia spontanicznych stanowisk tego gatunku w Polsce zebrali dane z krajowego zielnika i dostępnej bibliografii. *R. glauca*, jako uciekinier z hodowli, jest w Polsce gatunkiem rzadkim. Sumarycznie zidentyfikowano 45 jej stanowisk, powstałych samoistnie lub będących pozostałościami po dawnej uprawie (zlokalizowanych w 40 kwadratach sieci ATPOL). Rozprzestrzenianiu się tego gatunku może sprzyjać jego szeroka tolerancja, zarówno w odniesieniu do warunków klimatycznych, jak i siedliskowych. W związku z tym można się spodziewać, że w przyszłości lista stanowisk będzie wzrastać.

Słowa kluczowe: Rosaceae, rozmieszczenie stanowisk, potencjał inwazyjny, kenophyte

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