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Roses and hawthorns in an urban area: a case study of Gorzów Wielkopolski in Poland (NW Poland)

Introduction

A record of the flora in Gorzów, Poland, has not been coherently compiled. Scarce floristic data are presented in only a few publications. A total of 898 species of vascular plants (518 apophytes and 380 anthropophytes) have been found thus far. Studying mainly synanthropic flora and green areas of the city, the following species were identified: *Crataegus monogyna* Jacq., *C. laevigata* (Poir.) DC. (under the synonymic name *Crataegus oxyacantha* L.), *C. laevigata* 'Paul's Scarlet' (under the synonymic name *C. oxyacantha* L. Paul's Scarlet), *C. punctata* Jacq., *C. crus-galli* L., *C. coccinea* L., and *C. ×carrieri* Fauvel. In the genus *Rosa*, the following species were identified: *Rosa rugosa* Thunb., *R. canina* L. (under the synonymic name *R. dumetorum* Thuill.), *R. rubiginosa* L., and *R. multiflora* Thunb. Misiewicz (1981, 1986). Data on rose and hawthorn species occurring in the study area are also included in Zajac and Zajac (2001, 2019), where the following species were listed (generally in ATPOL squares): *Crataegus monogyna* (AC67 square), *C. rhipidophylla* (AC57 square) and *Rosa canina* (squares: AC57, AC67).

As shown in the publication of Sołtys-Lelek and Barabasz-Krasny (2015), areas in the north and east of Poland still require research and supplementation in terms of the occurrence of roses and hawthorns. Therefore, the aim of this research was to supplement the state of knowledge on the current distribution of the critical genera *Crataegus* L. and *Rosa* L. in this area, including presenting the full species composition and their distribution around Gorzów Wielkopolski.

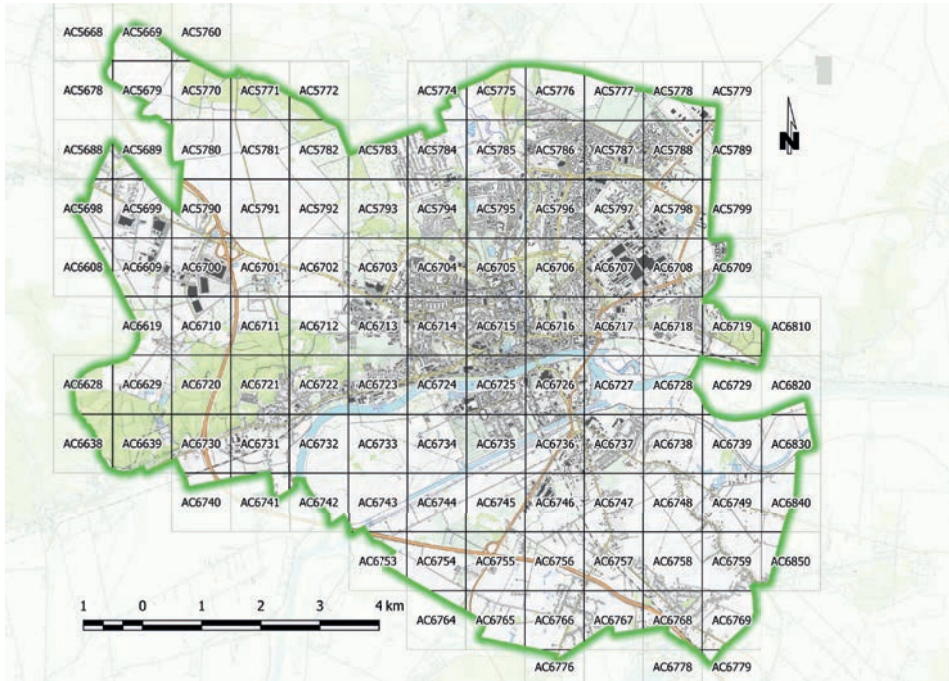


Fig. 1. Division of ATPOL (Atlas of Poland) squares into squares with a side of 1 km

Study area

The city of Gorzów Wielkopolski, with an area of 86.3 km², is located on the Warta River in north-western Poland, in Lubusz Voivodeship. According to the physical and geographic classification, it is situated within two mesoregions “Gorzów Plain” and “Gorzów Valley” (Kondracki, 2001). The average annual air temperature is 7.9 °C. The warmest month is July (17.2 °C), and the coldest month is January (−1.4 °C). The average annual precipitation is 500–600 mm (Studium, 2014). The length of the growing season is 220 days (Misiewicz, 1981).

The city area is varied in terms of plant communities. Aquatic and rush communities occur primarily in the Warta River valley. Meadow-pasture and tall-herb vegetation appears in many places and constitutes an important natural and landscape element in the city. However, most of the area is occupied by anthropogenic segregated and ruderal communities. Moreover, there are 10 city parks and 24 larger arranged squares and green areas. The city area is poor in forest areas. In the eastern areas of the city borders, there is one compact forest complex. Moreover, a small fragment of forest complex enters the city area from the north. Tree stands in this area are mainly pine, with some oak and birch. One of the most valuable natural areas of the city, where some remnants of naturalness have been preserved, is a mainstay of xerothermic flora communities, which

has been legally protected as the “Gorzowskie Murawy” reserve since 2006 (Studium, 2014; Pyszny et al., 2018).

Materials and methods

Floristic materials were collected in 2017–2019 using the field cartogram method, based on a grid of 10 × 10 km ATPOL squares. Each square was divided into 100 smaller squares (1 km side) that were each treated as a single site. Details of the ATPOL grid were adopted in accordance with methodological assumptions of the “Distribution atlas of vascular plants in Poland – ATPOL” (Zając, 1978; Komsta, 2016; Verey, 2017 – Fig. 1, Appendix 1a, b).

All herbarium materials were deposited in the Herbarium of the University School of Physical Education, Gorzów Wielkopolski (Poland). Data from the literature were also included. The taxonomic approach and nomenclature were based on the works of Zieliński (1985, 1987), Christensen (1992, 1997), Poppek (1996), and Henker (2000).

The number of habitats was the basis used to define the frequency of taxa occurrence: 1–4 stands – very rare species, 5–15 – rare species, 15–30 – not so frequent, 31–50 – quite frequent, 51–80 – frequent, 81–100 – very frequent, > 100 – common.

Abbreviations used in the list of species: (N) – new taxa for the study area, * – anthropophyte, [◊] – cultivated species.

Results

The list contains 11 hawthorn taxa, including 6 native taxa of the genus *Crataegus* L., belonging to 2 subseries *Erianthae* and *Crataegus*, and 5 classified as cultivated ornamental taxa. Moreover, 14 taxa of the genus *Rosa* L. belonged to the sections *Cin-namomeae* DC. (1 species), *Caninae* DC. em. H. Christ (11 taxa), and *Synstylae* DC. (1 species). Among them, there were 10 native species, including 2 native hybrid forms at the rank of species; 2 anthropophytes; 1 cultivated species; and 1 hybrid form. A total of 13 taxa new to the flora of the study area were found: 3 hawthorn taxa and 10 rose taxa.

A detailed list of localities with GPS coordinates is provided in Appendix 1 for the genus *Crataegus* and in Appendix 2 for the genus *Rosa*.

Genus *Crataegus* L.
Ser. *Crataegus*
Subser. *Erianthae*

1. *Crataegus laevigata* (Poiret) DC.
Synon.: *C. oxyacantha* L.

Rare species. This species was reported in the study area by Misiewicz (1981) under the synonymic name *Crataegus oxyacantha* L., as generally rare on roadsides and in thickets and parks. It was not found by the authors of this paper. Misiewicz (1986) reported at 3 localities: AC6706, AC6715, AC6716

Subser. *Crataegus*

2. *Crataegus rhipidophylla* Gand. var. *rhipidophylla*

Very rare species – 3 records from 3 localities. Species previously reported in ATPOL square AC57 (Zajac, Zajac, 2019)

3. *Crataegus monogyna* Jacq. var. *monogyna*

Quite frequent species – 75 records in 45 stands.

Species previously reported in ATPOL square AC67 (Zajac, Zajac, 2001) and generally, by Misiewicz (1981, 1986).

4. *Crataegus* × *macrocarpa* Hegetschw nothovar. *macrocarpa* (N)

[*C. laevigata* (Poiret) DC. × *C. rhipidophylla* Gand. var. *rhipidophylla*]

Very rare hybrid – 2 records from 2 localities.

5. *Crataegus* × *subsphaericea* Gand. nothovar. *subsphaericea* (N)

[*C. monogyna* Jacq. × *C. rhipidophylla* Gand. var. *rhipidophylla*]

Not so frequent hybrid – 19 records from 16 localities.

6. *Crataegus* × *media* Bechst. (N)

[*C. laevigata* (Poiret) DC. × *C. monogyna* Jacq.]

Very rare hybrid – 1 record from 1 locality.

Ornamental, cultivated taxa of hawthorns

7. [◇]*Crataegus laevigata* ‘Paul’s Scarlet’

Rare variety reported by Misiewicz (1986) as *C. oxyacantha* L. ‘Paul’s Scarlet’ – 9 localities: AC5797, AC6704, AC6705, AC6706, AC6707, AC6715, AC6716, AC6723, AC6726, and as element of urban street greenery.

8. **Crataegus punctata* Jacq.

Very rare species reported by Misiewicz (1986) – 1 locality: AC6726

9. **Crataegus crus-galli* L.

Very rare species reported by Misiewicz (1986) – 1 locality: AC6715

10. **Crataegus coccinea* L.

Very rare species reported by Misiewicz (1986) – 2 localities: AC6715, AC6716 and as element of urban street greenery.

11. [◇]*Crataegus* × *carrieri* Fauvel.

Very rare hybrid reported by Misiewicz (1986) – 1 locality: AC6715 and as element of urban street greenery.

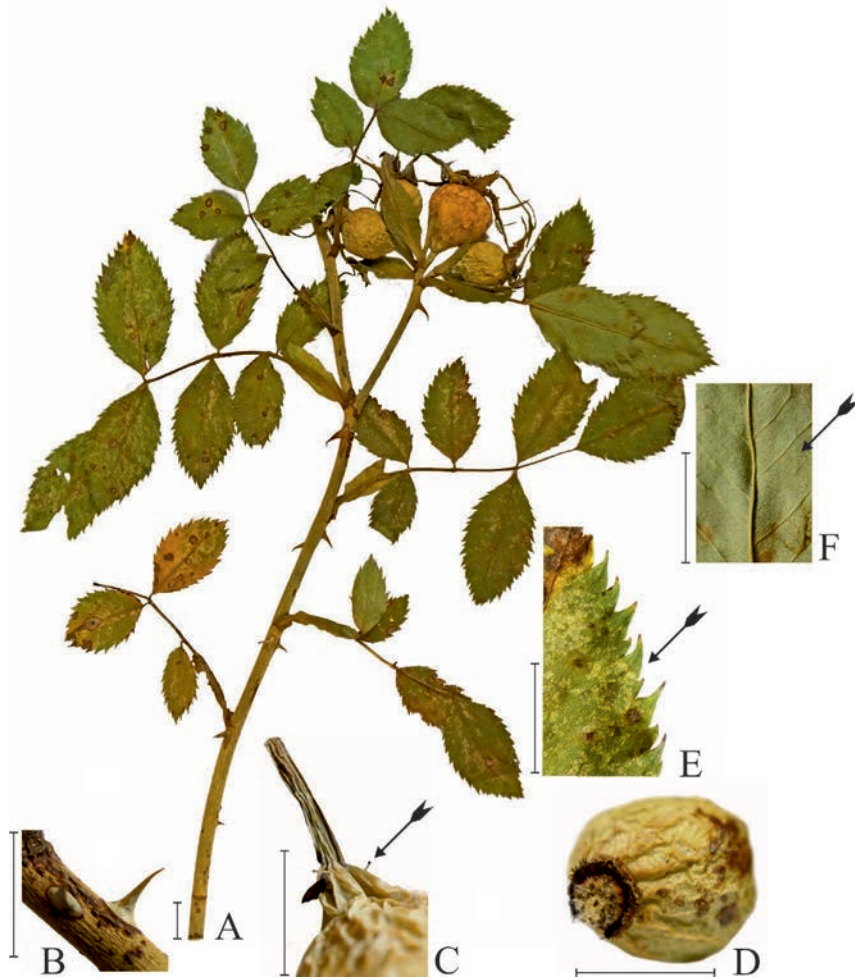


Fig. 2. *Rosa dumalis* Bechst. var. *caballicensis* (Puget) Boulenger; A – part of fruiting short shoot, B – thorn, C – glandular fruit, D – fruit, styles of semi-circular head type, E – double-serrated leaf margin, F – part of leaf (underside), hairless. Solid bar = 1 cm (Photo. 2018, A. Sołtys-Lelek, specimen from Poland, Gorzów Wielkopolski city, leg. 2017, W. Gruszka)

Genus *Rosa* L.

I. Sect. *Cinnamomeae* DC.

1. **Rosa rugosa* Thunb.

Very rare species (anthropophyte) – 5 records in 4 stands. Species previously reported by Misiewicz (1981, 1986) as occasional on escarpments, roadsides, and embankments.

II. Sect. *Caninae* DC. em. H. Christ.2. *Rosa dumalis* Bechst. (N)

Syn.: *R. afzeliana* Fr., *R. glauca* Vill, *R. caesia* Sm., *R. coriifolia* Fr.

Not so frequent species obtained from 25 localities as 4 varieties:

a) var. *afzeliana* (Fr.) Boulenger

Rare variety – 10 records from 9 localities.

b) var. *caballicensis* (Puget) Boulenger (Fig. 2)

Very rare variety – 1 record from 1 locality.

c) var. *dumalis*

Rare variety – 12 records from 11 localities.

d) var. *acharii* (Billb.) Boulenger

Very rare variety – 1 record from 1 locality.

e) var. *coriifolia* (Fr.) Boulenger

Very rare variety – 3 records from 3 localities.

3. *Rosa villosa* L. var. *villosa* (N)

Very rare species – 1 record from 1 locality.

4. *Rosa sherardii* Davies (N)

Very rare species, obtained from 4 localities as 2 varieties:

a) var. *sherardii*

Very rare variety – 3 records from 3 localities.

b) var. *collivaga* (Cottet) Boulenger

Very rare variety – 1 record from 1 locality.

5. *Rosa tomentosa* Sm. var. *cinerascens* (Dumort.) Crépin (N)

Very rare variety – 1 record from 1 locality.

6. *Rosa rubiginosa* L.

Rare species, obtained from 10 localities as 2 varieties:

a) var. *rubiginosa*

Very rare variety – 1 record from 1 locality.

b) var. *umbellata* (Leers) Dumort.

Rare variety – 9 records from 5 localities.

Species previously reported by Misiewicz (1981, 1986) as occasional in thickets and on roadside escarpments and buttresses.

7. *Rosa inodora* Fr. var. *indora* (N)

Very rare species – 4 records from 4 localities.

8. *Rosa canina* L.

Common species, formerly reported by Misiewicz (1981) as *R. dumetorum* Thuill. Later, reported by Zając, Zając, (2001) from ATPOL squares AC57 and AC67. Currently found as five varieties at 115 localities:

a) var. *canina*

Rare variety – 9 records from 8 localities.

b) var. *andegavensis* (Bastard.) Desp.

Very rare variety – 4 records from 4 localities.

c) var. *dumalis* Baker

Frequent variety – 132 records from 57 localities.

d) var. *deseglisei* (Boreau) Crépin

Very rare variety – 2 records from 2 localities.

e) var. *corymbifera* (Borkh.) Boulenger

Not so frequent variety – 26 records from 19 localities.

9. *Rosa jundzillii* Besler var. *jundzillii* (N) (Fig. 3A – Appendix 2)

Very rare variety – 3 records from 3 localities.

10. *Rosa* × *subcanina* (H. Christ) Vok. (N)

Hybrid originating from *R. dumalis* Bechst. × *R. canina* L. with bare leaves that are not hairy. It was reported here following Henker (2000) in species rank.

Not so frequent taxon – 16 records from 16 localities.

11. *Rosa* × *subcollina* (H. Christ) Vok. (N)

Hybrid originating from *R. dumalis* Bechst. × *R. canina* L. with hairy leaves. It was reported here following Henker (2000) in species rank.

Very rare taxon – 5 records from 4 localities.

12. *Rosa canina* L. × *R. rubiginosa* L. (N)

Very rare hybrid – 1 record from 1 locality.

III. Sect. *Synstylae* DC.

13. **Rosa multiflora* Thunb.

Very rare species (anthropophyte) – 5 records from 4 stands. Species previously reported by Misiewicz (1986) as planted in green areas.

Old garden hybrids occurring as semi-wild

14. [♀]*Rosa* × *francofourтана* Muenchh. (N) (Fig. 3B – Appendix 2)

Very rare hybrid – 1 record from 1 locality.

Discussion

Within the study area, the list of species in the genus *Crataegus* and *Rosa* comprised a total of 25 taxa, including 11 hawthorn species and 14 rose taxa. Among those identified, as many as 13 taxa were new to the flora of Gorzów Wielkopolski. These were: *Crataegus* × *macrocarpa*, *C.* × *subsphaericea*, *C.* × *media*, *Rosa dumalis*, *R. villosa*, *R. sherardii*, *R. tomentosa*, *R. inodora*, *R. jundzillii*, *R.* × *subcanina*, *R.* × *subcollina*, an old, cultivated variety of *R.* × *francofourтана*, and the interspecific hybrid *Rosa canina* × *R. rubiginosa*.

The study also provided detailed data on both the distribution of localities (Appendix 1, 2) and the number of localities of species already reported in the area. This allowed a more precise determination of the frequency of occurrence and provided a more accurate picture of their distribution in the study area. This applies, for example, to *Rosa rubiginosa* or *R. canina*, which are common species in Poland, that were previously reported from a single or few localities (Misiewicz, 1981, 1986). The data obtained during the study confirmed the poor state of knowledge regarding this area thus far. As indicated previously, some regions, e.g., the northern part of the country, require additional research and supplementation in terms of the occurrence of roses (Sołtys-Lelek, Barabasz-Krasny, 2015) and hawthorns.

Regarding the frequency of rose and hawthorn occurrence in the study area, 17 taxa were classified as very rare and were found in 4 localities, at most. The rarest taxa were those found at single localities: *Crataegus ×media*, *C. crus-galli*, *Rosa tomentosa*, *R. villosa*, *R. ×francofourtana*, and the hybrid *Rosa canina × R. rubiginosa*. The most common species were *Rosa canina* (115 localities), *Crataegus monogyna* (45 localities), and *Rosa dumalis* (25 localities). These were also the most common species of hawthorns and roses growing wild in Poland.

During field research, hybrid forms were found with characteristics that were intermediate between *R. canina* and *R. dumalis*. Additionally, forms that differed slightly in appearance from typical *R. dumalis* specimens were identified. According to some authors (Henker, 2000), they are attributed to a hybrid origin (*R. dumalis × R. canina*) and distinguished as separate taxa; *R. ×subcanina* had bare, non-hairy leaves, and *R. ×subcollina* had hairy leaves. According to other authors (Zieliński, 1985, 1987), these are only morphologically extreme groups of *R. dumalis* forms that, when combined with its typical specimens, comprise numerous intermediate individuals. In the present study, the concept by Henker (2000) was adopted to distinguish them as separate taxa.

The highest intraspecific variation was recorded for *Rosa canina* and *R. dumalis*, within which 5 varieties each were found. Among them, the most noteworthy were *Rosa canina* varieties, which are uncommon in Poland (Popek, 1996). These included: *R. canina* var. *andegavensis* with glandular peduncles and bare non-hairy leaves or *R. canina* var. *deseglisei* with glandular peduncles and hairy leaves. *R. canina* var. *andegavensis* has thus far been known only in the Wielkopolska Lowland, the Sudeten Foreland, the Płock Upland, and Piła, and *R. canina* var. *deseglisei* from the Szczecin, Silesian and Cracow Uplands, the Nida Basin, the Silesian Beskid, and Piła (Popek, 1996; Sołtys-Lelek, 2011, 2012; Sołtys-Lelek, Gruszcza, 2016).

Other more interesting varieties of roses found in this area undoubtedly include *Rosa dumalis*. *R. dumalis* var. *acharii* has glandular peduncles and sepals, and its fruits and leaves are complexly glandular and saw-toothed. In contrast, *R. dumalis* var.

caballicensis has glandular peduncles and sepals, but its leaves are singly or doubly saw-toothed. *R. dumalis* var. *acharii* has been reported in the Miechowska and Lubelska Uplands and the Pieniny Mountains. It also occurs sporadically in Central and Southern Europe (Popek, 1996). However, *R. dumalis* var. *caballicensis* is known only from Western Pomerania near Chojnice (Popek, 1996). *Rosa sherardii* var. *collivaga*, with leaves and peduncles that are not glandular, belongs to the group of rare taxa in Poland. It has been reported mainly from western and northern (near Kłodzko, Wałbrzych, Chojnów, Zielona Góra, Szczecin, and Piła) and southern Poland (Pieniny and Cracow-Częstochowa Upland; Popek, Szeląg, 1993; Popek, 1996; Sołtys-Lelek, 2011; Sołtys-Lelek, Gruszka, 2016).

Furthermore, an interesting species found in the study area was *Rosa jundzillii*. It is a rare species in Poland, occurring mainly in the southern part of the country (Sudeten Foothills, Silesian Lowland, and Kielce-Sandomierska Upland), and is distributed in the central part of the country. In the Gorzów Upland, it has not been reported thus far (Zajęc, Zajęc, 2001; Popek, 2002). However, this site is located in a long-urbanized area; thus, its origin is not fully known. It is likely that it may be a remnant of former cultivation.

Among hawthorns, the most interesting taxa are *Crataegus* \times *subsphaericea* and *Crataegus* \times *macrocarpa*, which are mainly reported in the south and east of Poland, while information about their occurrence in the northern part of the country is scarce (Christensen, 1992; Sołtys-Lelek, 2011, 2012; Oklejewicz, Vončina, 2012; Oklejewicz et al., 2013, 2014, 2015; Sołtys-Lelek, Gruszka, 2016, 2020; Zajęc, Zajęc, 2019).

Crataegus laevigata, which was previously reported by Misiewicz (1981, 1986), could not be found in this study. It is a common species in Poland, and the studied area is within its range. The localities where it occurred may have been transformed due to urban development of the city. However, specimens of this genus may be found in the future.

The species of the studied genus are a valuable element of the city flora. The flora that occurs here is characterised by specific conditions in areas that are urbanised to varying degrees. The flora of Gorzów Wielkopolski, on the one hand, is formed spontaneously, because of natural succession, and on the other hand, is also consciously cultivated by man. The following plants were planted in the study area for their decorative value: *Rosa rugosa*, *R. multiflora*, *R.* \times *francofourtana*, *Crataegus laevigata* 'Paul's Scarlet', *C. punctata*, *C. crus-galli*, *C. coccinea* and *C.* \times *carrieri*.

For rose and hawthorn species, the greatest number of localities was found in habitats described as wastelands. They also grow quite numerously on roadsides. The two most common species in Poland – *Rosa canina* and *R. dumalis* – were found in all distinguished habitat types, such as wastelands, roadsides, forest edges, and urban green areas. Additionally, the localities of *Crataegus monogyna* and *Crataegus* \times *subsphaericea* were recorded in a wide range of habitats, mainly the anthropogenic ones mentioned

above. Only *Crataegus ×media* was found in the natural habitat at the forest edge. The results obtained in this study were consistent with the literature data, which confirm the preference of roses and hawthorns in open, thermophilic, and heliophilic habitats (e.g., Zieliński, 1987; Christensen, 1996; Popek, 2002; Barabasz-Krasny, Sołtys-Lelek, 2011; Sołtys-Lelek, 2011, 2012; Oklejewicz et al., 2013, 2014, 2015; Sołtys-Lelek, Gruszka, 2016, 2020).

In general, a set of native hawthorn species and more than half of the rose species reported in Poland (considering only native species) were found within the study area. Such a result indicates the high species richness of a small area and human-transformed study site.

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Conflict of interest

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

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a) Stands of *Crataegus* species***Crataegus monogyna* var. *monogyna***

1. AC5771 (52°46'02,4" 15°09'43,6")
2. AC5775 (52°46'04,4" 15°13'23,2")
3. AC5781 (52°45'41,4" 15°09'45,5")
4. AC5784 (52°45'29,2" 15°12'41,1"; 52°45'38,7" 15°12'58,5")
5. AC5785 (52°45'43,5" 15°13'27,7")
6. AC5786 (52°45'26,1" 15°14'15,3")
7. AC5788 (52°45'34,9" 15°16'33,0"; 52°45'43,2" 15°16'36,2"; 52°45'56,4" 15°15'58,1")
8. AC5789 (52°45'31,7" 15°14'19,2")
9. AC5793 (52°44'58,6" 15°11'42,8"; 52°45'09,6" 15°12'17,3")
10. AC5794 (52°45'14,8" 15°12'34,8"; 52°45'16,1" 15°12'45,1")
11. AC5795 (52°45'06,5" 15°13'30,6"; 52°45'23,9" 15°13'42,0")
12. AC5796 (52°45'05,0" 15°14'17,0")
13. AC5797 (52°45'12,5" 15°15'10,4"; 52°45'19,2" 15°15'21,3"; 52°45'20,8" 15°15'22,0")
14. AC5798 (52°45'24,2" 15°15'58,1"; 52°45'25,4" 15°16'40,4")
15. AC6608 (52°44'34,3" 15°07'56,9")
16. AC6629 (52°43'20,5" 15°08'21,3")
17. AC6639 (52°42'40,3" 15°08'46,5")
18. AC6700 (52°44'17,7" 15°09'44,3"; 52°44'35,6" 15°09'18,2")
19. AC6703 (52°44'22,0" 15°12'25,5"; 52°44'40,2" 15°12'02,4"; 52°44'44,5" 15°12'15,5")
20. AC6704 (52°44'32,3" 15°12'39,7"; 52°44'45,3" 15°12'26,3"; 52°44'46,2" 15°13'16,5"; 52°44'46,3" 15°12'32,0")
21. AC6705 (52°44'42,8" 15°14'07,0")
21. AC6706 (52°44'47,7" 15°14'24,6")
22. AC6708 (52°44'45,5" 15°16'24,1"; 52°44'51,6" 15°16'34,1")
23. AC6711 (52°44'02,6" 15°10'28,9")
24. AC6712 (52°43'54,1" 15°11'11,3"; 52°43'54,5" 15°10'43,0"; 52°43'55,1" 15°11'23,6"; 52°43'57,2" 15°11'34,6"; 52°44'00,3" 15°11'17,3")
25. AC6715 (52°44'01,4" 15°13'37,8"; 52°44'04,4" 15°13'35,8"; 52°44'06,6" 15°13'36,6")
27. AC6716 (52°44'00,0" 15°15'00,4"; 52°44'09,4" 15°14'52,3"; 52°44'19,1" 15°14'47,3")
28. AC6717 (52°44'03,7" 15°15'57,8")
29. AC6718 (52°44'20,3" 15°16'50,2")
30. AC6719 (52°44'05,7" 15°16'57,4")
31. AC6722 (52°43'24,8" 15°11'04,9"; 52°43'26,8" 15°11'01,0")

32. **AC6723** (52°43'28,7" 15°11'39,6"; 52°43'42,1" 15°11'39,4")
33. **AC6724** (52°43'40,3" 15°13'07,1")
34. **AC6727** (52°43'22,8" 15°15'13,4")
35. **AC6730** (52°42'49,9" 15°09'06,0")
36. **AC6731** (52°42'41,9" 15°10'06,4"; 52°42'44,0" 15°09'59,4"; 52°42'44,8" 15°10'04,1")
37. **AC6732** (52°43'04,9" 15°10'54,2")
38. **AC6736** (52°42'47,9" 15°14'34,0"; 52°43'00,0" 15°14'37,6")
39. **AC6739** (52°42'50,7" 15°17'52,3")
40. **AC6747** (52°42'22,8" 15°15'37,8")
41. **AC6749** (52°42'40,1" 15°17'26,5")
42. **AC6754** (52°41'58,2" 15°13'14,4")
43. **AC6756** (52°42'00,7" 15°14'46,3")
44. **AC6757** (52°42'00,4" 15°15'47,5")
45. **AC6769** (52°41'40,6" 15°17'14,8")

C. rhipidophylla var. *rhipidophylla*

46. **AC5776** (52°46'13,0" 15°14'07,3")
47. **AC6619** (52°44'09,0" 15°08'36,4")
48. **AC6712** (52°44'08,6" 15°11'25,0")

C. ×media notha var. *media*

49. **AC6729** (52°43'52,8" 15°17'45,5")

C. ×macrocarpa notha var. *macrocarpa*

50. **AC5793** (52°45'09,7" 15°12'13,7")
51. **AC6745** (52°42'13,8" 15°14'06,7")

C. ×subsphaericea notha var. *subsphaericea*

52. **AC5775** (52°46'02,7" 15°13'44,9"; 52°46'16,5" 15°13'57,6")
53. **AC5784** (52°45'26,4" 15°12'45,8")
54. **AC5788** (52°45'57,1" 15°16'07,9")
55. **AC5793** (52°45'09,0" 15°12'19,7")
56. **AC5796** (52°45'02,7" 15°14'41,7")
57. **AC6629** (52°43'32,2" 15°08'33,4")
58. **AC6701** (52°44'16,9" 15°10'38,1")
59. **AC6709** (52°44'36,3" 15°17'03,0")
60. **AC6712** (52°43'54,5" 15°10'55,9")
61. **AC6713** (52°44'03,7" 15°12'07,4"; 52°43'48,7" 15°12'27,4")

62. **AC6714** (52°43'55,0" 15°13'02,8"; 52°43'52,2" 15°12'44,6")
63. **AC6722** (52°43'24,2" 15°11'11,7")
64. **AC6722** (52°43'26,0" 15°11'23,8")
65. **AC6724** (52°43'40,3" 15°12'35,8")
66. **AC6745** (52°42'14,6" 15°14'07,4")
67. **AC6747** (52°42'30,2" 15°15'20,7")

b) Stands of *Rosa* species

Rosa canina var. *andegavensis*

1. **AC5785** (52°45'34,0" 15°13'43,3")
2. **AC5795** (52°45'06,5" 15°13'30,6")
3. **AC6718** (52°44'09,3" 15°16'13,7")
4. **AC6757** (52°41'54,7" 15°16'08,0")

Rosa canina var. *canina*

5. **AC5775** (52°46'04,4" 15°13'23,2")
6. **AC5794** (52°45'17,2" 15°12'44,0")
7. **AC5797** (52°45'16,8" 15°15'13,7")
8. **AC6704** (52°44'46,1" 15°12'26,4")
9. **AC6706** (52°44'49,5" 15°14'22,8")
10. **AC6712** (52°43'58,2" 15°11'29,9")
11. **AC6715** (52°43'58,7" 15°13'35,5")
12. **AC6724** (52°43'46,4" 15°13'22,0"; 52°43'43,5" 15°12'32,4")

Rosa canina var. *corymbifera*

13. **AC5771** (52°46'02,4" 15°09'43,6")
14. **AC5793** (52°44'53,3" 15°11'31,9"; 52°44'58,6" 15°11'42,8"; 52°45'09,6" 15°12'17,3")
15. **AC5794** (52°44'51,4" 15°13'09,3")
16. **AC5798** (52°45'24,2" 15°15'58,1")
17. **AC6609** (52°44'32,1" 15°08'0,09")
18. **AC6701** (52°44'16,9" 15°10'36,1"; 52°44'16,9" 15°10'38,1")
19. **AC6702** (52°44'18,3" 15°11'24,2")
20. **AC6703** (52°44'40,6" 15°11'48,4"; 52°44'40,4" 15°12'18,3")
21. **AC6705** (52°44'44,2" 15°13'23,9")
22. **AC6707** (52°44'26,7" 15°15'19,1"; 52°44'36,6" 15°15'31,6")
23. **AC6712** (52°43'54,5" 15°10'55,9"; 52°43'58,1" 15°11'18,6")
24. **AC6714** (52°43'45,5" 15°12'30,4")
25. **AC6715** (52°44'03,1" 15°13'25,8"; 52°43'54,2" 15°13'28,4")

26. **AC6721** (52°43'32,7" 15°10'38,9")
 27. **AC6722** (52°43'20,4" 15°11'33,7")
 28. **AC6725** (52°43'37,4" 15°13'47,3")
 29. **AC6730** (52°42'58,9" 15°09'52,1")
 30. **AC6731** (52°42'44,7" 15°10'27,8")
 31. **AC6747** (52°42'30,2" 15°15'31,8")

Rosa canina var. *deseglisei*

32. **AC6709** (52°44'38,8" 15°17'03,3")
 33. **AC6714** (52°43'48,2" 15°13'02,9")

Rosa canina var. *dumalis*

34. **AC5699** (52°44'48,1" 15°08'18,1")
 35. **AC5776** (52°46'13,0" 15°14'07,3"; 52°46'04,2" 15°14'35,1")
 36. **AC5778** (52°46'03,0" 15°15'57,9")
 37. **AC5781** (52°45'41,5" 15°09'45,7")
 38. **AC5784** (52°45'29,2" 15°12'41,1"; 52°45'26,4" 15°12'45,8"; 52°45'38,7" 15°12'58,5")
 39. **AC5785** (52°45'43,5" 15°13'27,7")
 40. **AC5786** (52°45'42,7" 15°14'58,0")
 41. **AC5788** (52°45'56,4" 15°15'58,1"; 52°45'59,3" 15°16'19,1"; 52°45'35,6" 15°16'45,7"; 52°45'57,1" 15°16'07,9"; 52°45'34,9" 15°16'33,0")
 42. **AC5792** (52°44'51,1" 15°10'58,8")
 43. **AC5794** (52°44'50,5" 15°12'23,8"; 52°45'14,8" 15°12'34,8")
 44. **AC5795** (52°44'59,4" 15°13'43,2"; 52°45'05,1" 15°13'24,0"; 52°45'19,7" 15°13'20,4"; 52°45'20,8" 15°13'14,7")
 45. **AC5796** (52°45'08,4" 15°14'18,9")
 46. **AC5797** (52°45'17,9" 15°15'49,5"; 52°45'09,6" 15°15'19,8")
 47. **AC5798** (52°45'24,5" 15°16'23,6"; 52°45'14,0" 15°16'48,4"; 52°45'24,2" 15°15'58,1"; 52°45'28,8" 15°16'40,8"; 52°45'24,9" 15°16'37,6")
 48. **AC6608** (52°44'34,3" 15°07'56,9")
 49. **AC6609** (52°44'32,1" 15°08'0,09")
 50. **AC6619** (52°43'57,2" 15°08'42,8")
 51. **AC6629** (52°43'20,5" 15°08'21,3"; 52°43'32,2" 15°08'33,4")
 52. **AC6700** (52°44'35,6" 15°09'18,2")
 53. **AC6701** (52°44'16,9" 15°10'36,1"; 52°44'16,9" 15°10'38,1")
 54. **AC6702** (52°44'43,0" 15°11'29,4")
 55. **AC6703** (52°44'29,9" 15°11'48,2"; 52°44'37,1" 15°12'19,8"; 52°44'18,3" 15°11'38,1"; 52°44'33,8" 15°12'18,3")

56. **AC6704** (52°44'31,0" 15°12'31,6")
57. **AC6705** (52°44'42,4" 15°14'04,6"; 52°44'44,2" 15°13'26,4"; 52°44'24,0" 15°13'50,9"; 52°44'41,9" 15°13'58,7"; 52°44'42,8" 15°14'07,0"; 52°44'45,8" 15°13'43,4")
58. **AC6706** (52°44'50,1" 15°14'44,9")
59. **AC6707** (52°44'33,4" 15°15'13,8"; 52°44'40,4" 15°15'12,1")
60. **AC6708** (52°44'31,1" 15°16'09,0"; 52°44'35,8" 15°16'29,8"; 52°44'51,6" 15°16'34,1")
61. **AC6710** (52°44'11,0" 15°09'38,8"; 52°44'05,6" 15°09'27,9")
62. **AC6711** (52°44'08,9" 15°10'25,3")
63. **AC6712** (52°43'58,9" 15°10'47,3"; 52°44'00,3" 15°11'17,3"; 52°43'52,7" 15°11'09,1"; 52°43'51,4" 15°11'22,2")
64. **AC6713** (52°44'03,7" 15°12'07,4"; 52°43'58,8" 15°12'21,9"; 52°44'06,1" 15°12'26,5"; 52°44'08,8" 15°12'03,5"; 52°44'03,0" 15°12'02,9")
65. **AC6714** (52°43'55,1" 15°12'59,0"; 52°43'53,6" 15°13'01,0"; 52°43'51,8" 15°12'44,2"; 52°43'51,9" 15°12'44,4"; 52°44'10,9" 15°13'05,3")
66. **AC6715** (52°44'06,6" 15°13'36,6"; 52°44'02,7" 15°13'24,8"; 52°44'04,6" 15°13'34,6"; 52°43'54,4" 15°13'55,4")
67. **AC6716** (52°43'51,0" 15°14'35,5"; 52°44'15,3" 15°14'52,8")
68. **AC6717** (52°44'06,2" 15°15'28,6")
69. **AC6718** (52°44'13,1" 15°16'26,0"; 52°44'05,1" 15°16'11,2"; 52°44'16,4" 15°16'37,1"; 52°44'11,9" 15°16'45,9")
70. **AC6719** (52°44'10,7" 15°16'55,2")
71. **AC6721** (52°43'13,8" 15°10'29,5"; 52°43'37,5" 15°10'36,5")
72. **AC6722** (52°43'26,8" 15°10'56,0"; 52°43'15,7" 15°11'06,5"; 52°43'29,6" 15°11'03,8"; 52°43'21,5" 15°11'08,2"; 52°43'22,6" 15°11'08,8"; 52°43'36,4" 15°11'05,4"; 52°43'36,1" 15°10'57,7")
73. **AC6723** (52°43'28,7" 15°11'39,6"; 52°43'33,7" 15°11'52,3"; 52°43'33,1" 15°12'21,0"; 52°43'39,5" 15°12'12,3")
74. **AC6724** (52°43'40,9" 15°13'06,5"; 52°43'36,1" 15°12'35,5"; 52°43'40,7" 15°12'36,1")
75. **AC6727** (52°43'39,6" 15°15'15,3"; 52°43'26,9" 15°15'34,5"; 52°43'24,1" 15°15'16,4")
76. **AC6729** (52°43'52,8" 15°17'45,5")
77. **AC6730** (52°42'49,9" 15°09'06,0")
78. **AC6731** (52°42'44,7" 15°10'27,8"; 52°42'44,8" 15°10'04,1"; 52°42'44,0" 15°09'59,4"; 52°42'41,9" 15°10'06,2")
79. **AC6732** (52°43'05,4" 15°10'55,1")
80. **AC6733** (52°43'10,5" 15°12'24,5")

81. **AC6736** (52°43'16,7" 15°14'54,2"; 52°42'51,9" 15°14'39,7"; 52°42'51,9" 15°15'11,3"; 52°42'58,0" 15°15'12,8"; 52°42'47,3" 15°14'25,4")
 82. **AC6737** (52°42'57,7" 15°15'17,4")
 83. **AC6745** (52°42'15,1" 15°14'08,5")
 84. **AC6746** (52°42'29,5" 15°14'22,9"; 52°42'35,5" 15°15'15,1")
 85. **AC6747** (52°42'30,2" 15°15'31,8"; 52°42'22,0" 15°15'19,6"; 52°42'30,2" 15°15'20,7")
 86. **AC6756** (52°42'00,7" 15°14'46,3"; 52°42'08,4" 15°14'42,6")
 87. **AC6758** (52°41'44,0" 15°16'44,4")
 88. **AC6765** (52°41'36,6" 15°13'41,1")
 89. **AC6766** (52°41'27,9" 15°14'59,3")
 91. **AC6769** (52°41'40,4" 15°17'21,6")

Rosa canina* × *R. rubiginosa

92. **AC6703** (52°44'18,3" 15°11'35,6")

Rosa dumalis* var. *acharii

93. **AC6715** (52°44'06,6" 15°13'34,6")

Rosa dumalis* var. *afzeliana

94. **AC5793** (52°45'09,0" 15°12'19,7")
 95. **AC5794** (52°45'16,7" 15°12'44,4"; 52°45'17,7" 15°12'52,1")
 96. **AC6713** (52°43'59,6" 15°11'51,4")
 97. **AC6717** (52°44'00,2" 15°15'36,2")
 98. **AC6722** (52°43'19,9" 15°11'21,2")
 99. **AC6725** (52°43'31,1" 15°14'04,6")
 100. **AC6736** (52°43'11,2" 15°14'30,6")
 101. **AC6746** (52°42'43,5" 15°14'35,3")
 102. **AC6747** (52°42'14,8" 15°15'41,8")

Rosa dumalis* var. *caballicensis

103. **AC5793** (52°44'53,3" 15°11'31,9")

Rosa dumalis* var. *coriifolia

104. **AC5776** (52°46'03,7" 15°14'40,1")
 105. **AC6724** (52°43'13,4" 15°12'46,1")
 106. **AC6736** (52°42'57,9" 15°14'41,4")

Rosa dumalis var. *dumalis*

107. AC5797 (52°44'58,8" 15°15'18,0")
 108. AC6639 (52°42'39,4" 15°08'47,2")
 109. AC6703 (52°44'30,2" 15°12'12,4")
 110. AC6712 (52°43'48,3" 15°11'21,6")
 111. AC6714 (52°44'13,5" 15°13'05,2")
 112. AC6715 (52°44'06,6" 15°13'36,6")
 113. AC6722 (52°43'26,8" 15°10'56,0"; 52°43'26,8" 15°11'01,0")
 114. AC6723 (52°43'33,1" 15°12'13,4")
 115. AC6731 (52°42'41,5" 15°10'07,1")
 116. AC6749 (52°42'31,9" 15°17'26,4")
 117. AC6756 (52°42'00,7" 15°14'46,3")

Rosa inodora var. *inodora*

118. AC6702 (52°44'17,9" 15°11'23,5")
 119. AC6712 (52°43'44,3" 15°11'33,5")
 120. AC6731 (52°42'41,4" 15°10'08,3")
 121. AC6745 (52°42'14,5" 15°14'06,1")

Rosa jundzillii var. *jundzillii*

122. AC5788 (52°45'35,7" 15°16'29,8")
 123. AC5794 (52°45'16,7" 15°12'44,4")
 124. AC6722 (52°43'20,7" 15°11'02,7")

Rosa multiflora

125. AC5793 (52°44'50,5" 15°12'23,4")
 126. AC5894 (52°45'12,2" 15°12'27,3")
 127. AC6726 (52°43'40,6" 15°14'42,3"; 52°43'23,4" 15°14'52,8")
 128. AC6739 (52°42'50,7" 15°17'52,3")

Rosa rubiginosa var. *rubiginosa*

129. AC6702 (52°44'17,7" 15°11'12,8")

Rosa rubiginosa var. *umbellata*

130. AC5795 (52°45'23,7" 15°13'43,2")
 131. AC6703 (52°44'19,8" 15°12'22,6"; 52°44'27,2" 15°12'13,9"; 52°44'27,2" 15°12'13,4"; 52°44'30,2" 15°12'12,4")
 132. AC6704 (52°44'46,3" 15°12'32,0"; 52°44'44,1" 15°12'44,0")
 133. AC6712 (52°43'55,1" 15°11'23,6")
 134. AC6757 (52°41'49,5" 15°15'54,3")

Rosa rugosa

135. AC5788 (52°45'33,5" 15°16'41,1; 52°45'39,9" 15°16'40,7")
 136. AC6716 (52°44'17,4" 15°14'48,7")
 137. AC6731 (52°42'43,6" 15°10'02,2")
 138. AC6732 (52°43'03,5" 15°10'52,4")

Rosa sherardii* var. *collivaga

139. AC6714 (52°43'52,2" 15°12'44,6")

Rosa sherardii* var. *sherardii

140. AC6703 (52°44'18,3" 15°11'38,1")
 141. AC6747 (52°42'32,2" 15°15'30,3")
 142. AC6756 (52°42'05,4" 15°14'32,6")

Rosa tomentosa* var. *cinerscens

143. AC6736 (52°43'07,9" 15°14'31,8")

Rosa villosa* var. *villosa

144. AC5788 (52°45'31,7" 15°16'44,2")

Rosa* ×*francofourtana

145. AC6756 (52°42'08,4" 15°14'42,6")

Rosa* ×*subcollina

146. AC6707 (52°44'32,4" 15°15'30,1")
 147. AC6712 (52°43'52,7" 15°11'9,1")
 148. AC6722 (52°43'20,6" 15°11'34,4")
 149. AC6736 (52°43'07,5" 15°14'31,1"; 52°43'00,7" 15°14'32,8")

Rosa* ×*subcanina

150. AC5795 (52°44'53,7" 15°13'42,3")
 151. AC5796 (52°45'02,5" 15°14'55,2")
 152. AC5797 (52°45'01,6" 15°15'21,6")
 153. AC5798 (52°45'22,9" 15°16'36,8")
 154. AC5799 (52°45'17,2" 15°16'51,4")
 155. AC6629 (52°43'27,9" 15°08'29,3")
 156. AC6703 (52°44'21,0" 15°12'23,3")
 157. AC6705 (52°44'46,6" 15°13'43,4")
 158. AC6708 (52°44'45,5" 15°16'24,1")

- 159. **AC6711** (52°44'00,2" 15°10'25,7")
- 160. **AC6717** (52°44'19,7" 15°15'56,1")
- 161. **AC6718** (52°44'09,7" 15°16'22,4")
- 162. **AC6722** (52°43'24,2" 15°11'11,7")
- 163. **AC6724** (52°43'36,8" 15°12'37,6")
- 164. **AC6736** (52°42'55,0" 15°14'21,7")
- 165. **AC6746** (52°42'31,7" 15°14'29,0")



Fig. 3. *Rosa jundzillii* Besler var. *jundzillii*, specimen from Poland, Gorzów Wielkopolski city, Zwiadowców Street (A); *Rosa* ×*francofourтана* Muenchh., specimen from Poland, Gorzów Wielkopolski city, Podgórna Street (B) (Photo. 2018, W. Gruszka)

Abstract

This paper presents the distribution of species of the genera *Crataegus* and *Rosa* in Gorzów Wielkopolski, Poland. Based on literature data and field research, 25 taxa were found to occur here, comprising 11 hawthorn species and 14 rose taxa. Among the taxa of hawthorns, 6 were native taxa belonging to 2 subseries *Erianthae* and *Crataegus*, and 5 were classified as cultivated ornamental taxa. Among the taxa of genus *Rosa* L., there were 10 native species (including 2 native hybrid forms at the rank of species), 2 anthropophytes, 1 cultivated species, and 1 hybrid form. Among those identified, as many as 13 taxa were new to the flora of Gorzów Wielkopolski. These were *Crataegus* × *macrocarpa*, *C.* × *subsphaericea*, *C.* × *media*, *Rosa dumalis*, *R. villosa*, *R. sherardii*, *R. tomentosa*, *R. inodora*, *R. jundzillii*, *R.* × *subcanina*, *R.* × *subcollina*, the old, cultivated variety *R.* × *francofourтана*, and an interspecific hybrid *Rosa canina* × *R. rubiginosa*. The occurrence of *Rosa jundzillii*, a species rare in Poland and not previously reported in the Gorzów Upland, was noted during the study. The following varieties of roses that are rare in Poland were also found: *R. dumalis* var. *acharii*, *R. dumalis* var. *caballicensis*, *R. canina* var. *andegavensis*, and *R. canina* var. *deseglisei*. This study showed that although the city area is strongly transformed by man, there is a high diversity of taxa of the studied genera.

Key words: *Crataegus*, distribution of critical species, list of species, Poland, *Rosa*, Rosaceae

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Róże i głogi obszarów zurbanizowanych: na przykładzie Gorzowa Wielkopolskiego (NW Poland)

Streszczenie

W artykule przedstawiono rozmieszczenie gatunków z rodzajów *Crataegus* i *Rosa* na obszarze Gorzowa Wielkopolskiego. Na podstawie danych z bibliografii oraz badań własnych stwierdzono tu występowanie 25 taksonów, w tym: 11 gatunków głogów i 14 taksonów róż. Spośród głogów, 6 taksonów to gatunki rodzime, należące do subserii *Erianthae* i *Crataegus*, a 5 zaliczanych jest do hodowlanych taksonów ozdobnych. Spośród gatunków rodzaju *Rosa*, 10 to rodzime elementy flory (w tym 2 formy mieszańcowe ujęte w randze gatunku), a wśród pozostałych 2 antropofity: 1 tzw. starą odmianę hodowlaną i 1 formę mieszańcową. Wśród odnotowanych taksonów, aż 13 jest nowych dla flory miasta Gorzowa Wielkopolskiego: *Crataegus* × *macrocarpa*, *C.* × *subsphaericea*, *C.* × *media*, *Rosa dumalis*, *R. villosa*, *R. sherardii*, *R. tomentosa*, *R. inodora*, *R. jundzillii*, *R.* × *subcanina*, *R.* × *subcollina* oraz stara odmiana hodowlana *R.* × *francofourтана* i mieszańiec międzygatunkowy *Rosa canina* × *R. rubiginosa*. W trakcie badań odnotowano tutaj występowanie rzadkiego w Polsce gatunku *Rosa jundzillii*, który z Wyżyny Gorzowskiej nie był do tej pory podawany. Znalaziono także rzadkie w Polsce odmiany róż, jak: dla *Rosa dumalis*: *R. dumalis* var. *acharii* i *R. dumalis* var. *caballicensis* oraz dla *Rosa canina*: *R. canina* var. *andegavensis* i *R. canina* var. *deseglisei*. Przeprowadzone badania wykazały, iż pomimo że obszar miasta jest terenem silnie przekształconym przez człowieka, to występuje tu duże zróżnicowanie taksonów z analizowanych rodzajów.

Słowa kluczowe: *Crataegus*, rozmieszczenie gatunków krytycznych, lista gatunków, Polska, *Rosaceae*, *Rosa*

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