

MAŁGORZATA KLIMKO, GRZEGORZ KACZMAREK

DENDROFLORA OF THE TOWN OF JAROCIN

*From Department of Botany
The August Cieszkowski Agricultural University of Poznań*

ABSTRACT. The study presents results of investigations on the dendroflora of the town of Jarocin within its administrative limits. Studies were conducted on plants found in natural and seminatural habitats. A total of 183 species were identified. The dominant role in the dendroflora of the town is played by species of foreign origin. The overall condition of trees and shrubs in the town is good, as it is manifested by the presence of 72 trees, which have reached the dimensions of nature monuments, and two having the status of nature monuments.

Key words: trees and shrubs, Jarocin, Wielkopolska

Introduction

Jarocin is a small town, occupying the area of 14.44 km² in south-central part of the Wielkopolskie province. It is located in the Kalisz Plateau, which is an extension of the Leszno Plateau in the easterly direction. Both mesoregions are divided by the Gostyń-Rawicz Depression. In the most part the area belongs to the Warta basin, and only the southern part – to the Barycz basin (the Orla river and several smaller watercourses). The Warta is supplied by the Prosna river, flowing through the eastern part of the plateau, and in the northern part by the Lutynia. The latter flows at a distance of approx. 1.5 km east of Jarocin (**Kondracki** 2001).

The landscape of the Jarocin Plain (microregion) is an old-glacial landscape, as manifested by the occurrence of vast plains of a denuded ground moraine with slight differences in height of up to 5 m and no natural lakes. Soils of the Jarocin Plain are mediocre in terms of fertility. They are primarily brown and podzolic soils (light and medium-heavy soils), formed from boulder clays and loamy and silty sands (**Grygiel** 1998).

Jarocin is located in the Central Wielkopolska climatic region, which is the largest region in the entire Wielkopolska Lowland (**Woś** 1994).

The aim of the study was to present the diversity of dendroflora in the town of Jarocin, as well as attempt to show a relationship between its composition and different methods of municipal land use.

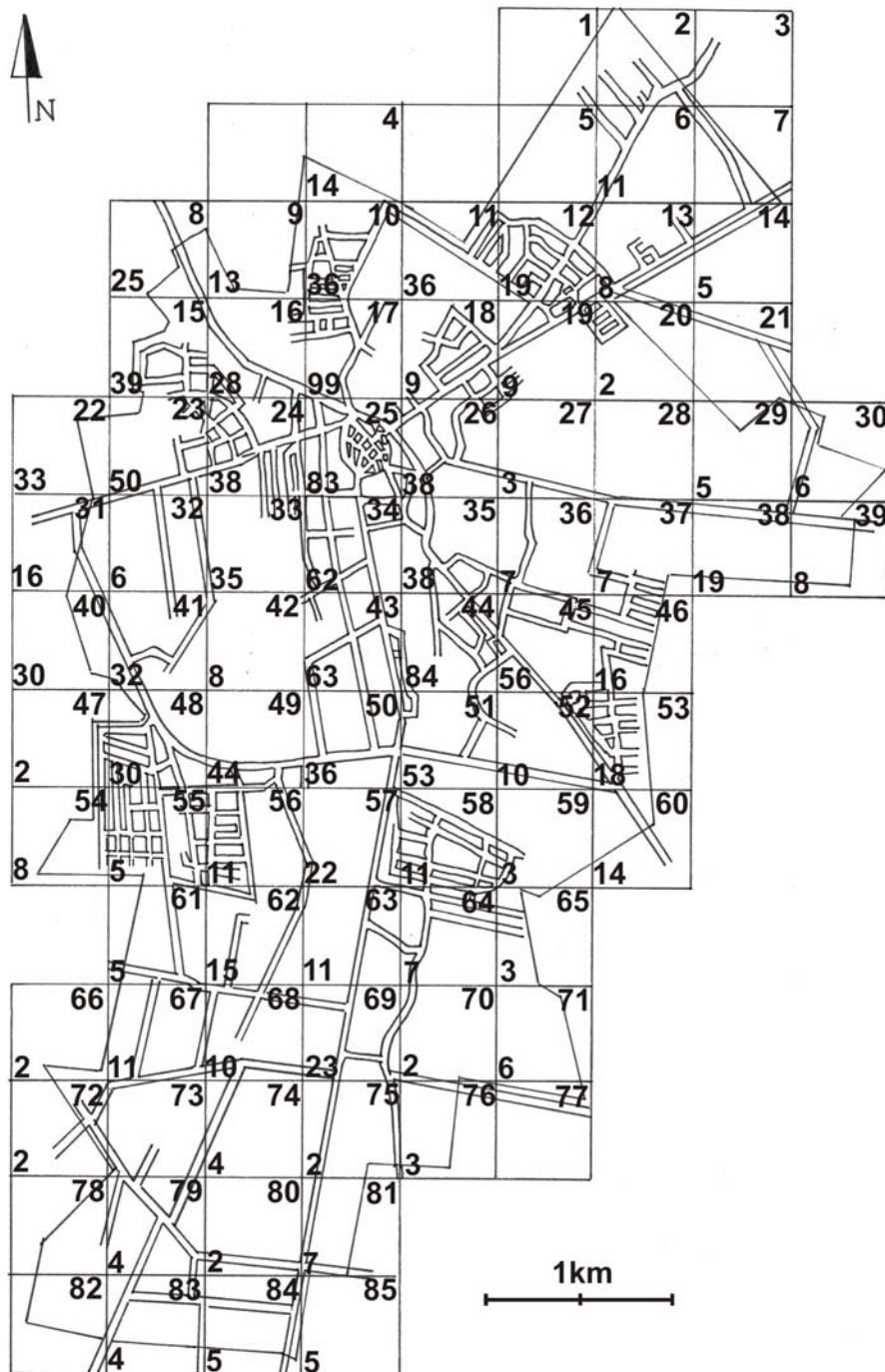


Fig. 1. Grid of numbered basic squares and number of species on the background of the city plan
 Ryc. 1. Siatka zanumerowanych pól podstawowych i liczba gatunków na tle planu miasta

Material and methods

The dendroflora survey was conducted in Jarocin in the years 2004-2006. The survey covered the whole territory of Jarocin within its administrative boundaries. The scope of the survey included vegetation found both in municipal green areas, such as parks, greens, avenues, greens in housing estates, greens around churches or schools, and wild plants growing in natural and seminatural areas: fragments of productive forests, wild self-sown trees and shrubs, baulks, roadsides, railroad embankments, ruderal sites, etc. The dendroflora of private property, industrial plants and the area of the military barracks was excluded. Among trees and shrubs growing in Jarocin cemeteries (municipal, Roman Catholic parish and Evangelical) only native species and permanently settled alien species were included in the study.

Dendroflora was mapped in a grid of identical primary plots – squares with side length of 500 m (Fig. 1). The current street plan was prepared on the basis of a 1:10 000 map. The area within the city limits was divided into 85 squares (Fig. 1). Dendroflora of the town was characterized in terms of the division into groups of species distinguished into their geo-historical origin, relationships with plant formations and phytosociological units (the so-called socio-ecological groups) and their position in taxonomy. Values of the above mentioned features were adopted after **Chmiel** (1993) and **Seneta and Dolatowski** (2004).

Nomenclature of trees and shrubs was adopted following studies by **Mirek et al.** (2002) and **Seneta and Dolatowski** (2004).

Special emphasis was put on trees with dimensions of nature monuments. Stem circumference was measured using a measuring tape at the height of 1.3 m from the ground level.

Results

The location and description of the Municipal Park

The Municipal Park occupies the area of approx. 30 ha, its 150-year history was connected with the Radoliński family – owners of the town in the years 1661-1945 (although it is believed that long before the park was established there had been the castle gardens on that site). The Radolińskis commissioned the task of designing and establishing the park to Peter Joseph Lenné, the creator of parks in e.g. Vienna and Berlin, the Szczytnicki Park in Wrocław and the famous royal gardens in Potsdam (**Anders** 1992).

The Jarocin park was established in 1845 as a park and palace complex, as inside the park two years later the construction of a palace in the English Neo-Gothic style was initiated, which was completed in 1853. It was designed by an outstanding architect from Berlin, Friedrich August Stüler, while the construction was supervised by another known architect of those times – Karl Württemberg.

The Park looks like English style gardens. It has the character of natural forest, in which the tree stand is closed and mature. Almost the entire park is located on fertile soils with good water relations, as it is manifested by the health of trees, considerable size they reach and the readily occurring natural restocking. Soil fertility is also evident when considering the species composition of undergrowth. The undergrowth in a con-

siderable area is typical of Central European oak-hornbeam forest. The most common species of undergrowth plants include wood anemone (*Anemone nemorosa* L.), pilewort (*Ficaria verna* Huds.), yellow star of Bethlehem (*Gagea lutea* (L.) Ker Gawl.), pale wood violet (*Viola reichenbachiana* Jord. ex Boreau) and Siberian squill (*Scilla sibirica* Haw.). Later they are replaced by such species as hedge garlic *Alliaria petiolata* (M. Bieb.) Cavara & Grande, bugle-weed (*Ajuga reptans* L.) and greater celandine (*Chelidonium majus* L.).

Apart from vast fragments in a typically English park style, there are some French style elements in the park design. In the southern part of the park there is a relatively large pond. In recent years it has been renovated and a fountain was installed in its centre. It is a pond with a stream flowing through it, supplied by waters of the Lipówka river flowing through the park. Nearby there is another, much smaller pond supplied by the same watercourse. Opposite the palace and immediately behind it and in the very centre of the park there are small clearings, overgrown with dense grass swards. These treeless areas are excellent elements, adding variety to the rather monotonous appearance of the park and making it look more spacious. Next to the palace there is a trellis of colourfully flowering shrubs. Species planted there include amber-bloom rhododendron (*Rhododendron luteum*), pink flowering varieties of *Rhododendron yakushimanum*, Catawba rhododendron (*R. catawbiense*), different species of weigela (genus *Weigela*) and orange-eye buddlea (*Buddleja davidii*).

A fragment of the northern part of the park is overgrown with old spruce trees (*Picea abies*). Huge Weymouth pines (*Pinus strobus*) need also to be mentioned here. Apart from spruces and Weymouth pines there is also a group of several dozen large coast-Douglas firs (*Pseudotsuga menziesii*). Several of them have stems with circumferences of over 200 cm, while that of the thickest tree was 255 cm. In the centre of the park there are also three black pines (*Pinus nigra*), a group of European larch trees (*Larix decidua*) and several scattered white firs (*Abies concolor*).

Along the western and northern side of the park extends an exceptionally beautiful alley of over 1 km (one of the longest in Europe), lined with hornbeams (*Carpinus betulus*). Parallel to it runs another, wider and almost 700 m long, planted with very old *Quercus rubra* trees. Many of them have stems with circumferences of over 250 cm, while the thickest tree has a circumference of 353 cm.

The area of the park is predominantly occupied by deciduous trees. The most abundantly represented species include common oak (*Quercus robur*), red oak (*Quercus rubra*), Norway maple (*Acer platanoides*), sycamore maple (*Acer pseudoplatanus*), hornbeam (*Carpinus betulus*), small-leaved lime (*Tilia cordata*), common ash (*Fraxinus excelsior*) and black locust (*Robinia pseudoacacia*). The following species are slightly less numerous in the ground cover: common beech (*Fagus sylvatica*), Russian elm (*Ulmus laevis*), wych elm (*Ulmus glabra*), field maple (*Acer campestre*), horsechestnut (*Aesculus hippocastanus*), etc. Many of the above mentioned tree species regenerate spontaneously. This pertains primarily to Norway, sycamore and field maples, common and red oaks, Russian and wych elms, as well as hornbeam. Stand structure exhibits distinct stratification. Apart from the upper storey of tall trees, the shrub and lower tree layer is also well-developed. The most numerous shrubs include black elder (*Sambucus nigra*), VanHoutte spiraea (*Spiraea ×vanhouttei*), fuzzy deutzia (*Deutzia scabra*), mock orange (*Philadelphus* sp.), common snowberry (*Symphoricarpos albus*), common barberry (*Berberis vulgaris*) and golden currant (*Ribes aureum*).

A total of 44 trees with dimensions of nature monuments were recorded in the area of the Municipal Park in Jarocin (in plots 17 and 25).

A list of species and their location

The list of tree and shrub species found in the analysed area of Jarocin is given below.

Legend: 1, 2, 3..., 85 – numbers of squares, e.g. 54-58 – species recorded in squares 54, 55, 56, 57, 58.

- Abies concolor* (Gordon et Glend.) Lindl. ex Hildebr. – 17, 18, 23, 25, 34, 45
Abies grandis (Douglas ex D. Don) Lindl. – 45
Abies koreana E.H. Wilson – 17, 26
Acer campestre L. – 4, 10, 11, 12, 17, 18, 25, 33, 41, 50
Acer negundo L. – 11, 14, 15, 17, 18, 25, 26, 33, 34, 43, 44, 49, 50, 84, 85
Acer palmatum Thunb. – 12, 25
Acer platanoides L. – 4, 6, 8, 10, 11, 15, 16, 17, 18, 22, 23, 25, 26, 33, 34, 35, 38, 43, 44, 45, 49, 50, 51, 53, 57, 60, 68, 69, 81, 85
Acer pseudoplatanus L. – 6, 9, 10, 15, 17, 18, 22-25, 31, 40, 41, 43-45, 50, 51-53, 60
Acer saccharinum L. – 17, 25
Acer tataricum subsp. *ginnala* (Maxim.) Wesm. – 44
Aesculus xcarnea Hayne – 17, 18
Aesculus hippocastanum L. – 6, 10, 11, 17, 18, 23, 24, 26, 33, 34, 43-45, 49-51, 69
Ailanthus altissima (Miller) Swingle – 25
Alnus glutinosa (L.) Gaerth – 8, 15, 16, 17, 22, 23, 31, 35, 40, 41, 43, 48, 50-52, 57, 59, 63, 64, 68
Alnus incana (L.) Moench – 17, 31, 40, 41
Amelanchier spicata (Lam.) K. Koch non G.N. Jones – 44
Berberis julianae C.K. Schneid. – 25, 61
Berberis koreana Palib. – 44
Berberis xottawensis C.K. Schneid. – 17, 18, 25, 34
Berberis thunbergii DC. – 17, 18, 25, 26, 34, 43, 44, 51
Berberis verruculosa Hemsl. et E.H. Wilson – 17, 25
Berberis vulgaris L. – 17, 18, 25, 34, 43, 44, 51
Betula pendula Roth – 6, 10-12, 15-19, 22-26, 31, 33-35, 40-45, 47-51, 54-58, 62, 63, 67, 69, 79, 81
Betula pubescens Ehrh. – 75
Buddleja davidii Franch. – 17, 49
Buxus sempervirens L. – 12, 18, 25, 34, 44, 45, 51
Caragana arborescens Lam. – 18, 23, 26, 50, 51
Caragana frutex (L.) K. Koch – 60
Carpinus betulus L. – 8, 10, 11, 15, 17, 18, 22-25, 31, 34, 35, 38, 40, 41, 48, 53, 54, 60, 67, 71, 75
Catalpa bignonioides Walter – 25
Cerasus avium (L.) Moench – 8, 10, 11, 17, 22, 23, 41, 44, 45, 48-51
Cerasus vulgaris Mill. – 25, 41, 44, 58, 68
Chaenomeles japonica (Thunb.) Lindl. ex Spach – 10, 17, 24-26, 35
Chaenomeles speciosa (Sweet) Nakai – 12, 44, 45
Chamaecyparis lawsoniana (A. Murray) Parl. – 25, 31, 33, 43-45, 51
Chamaecyparis nootkatensis (D. Don) Spach – 45
Chamaecyparis pisifera (Siebold et Zucc.) Endl. – 35

- Clematis vitalba* L. – 10, 15-17, 24-26, 33-35, 44, 50, 51
Colutea arborescens L. – 17, 44
Cornus alba L. – 17, 18, 24, 25, 34, 43-45, 51
Cornus sanguinea L. – 4, 15, 25
Corylus avellana L. – 22, 23, 40, 41, 48
Cotoneaster boisianus G. Klotz – 17, 34, 44
Cotoneaster hjelmqvistii Flinck et Hylmö – 26, 34, 45
Cotoneaster lucidus Schldl. – 23
Cotoneaster przewalskii Pojark. – 44
Cotoneaster x suecicus Klotz (Grupa Skogholm) – 26, 35, 45
Cotoneaster sp. div. – 17, 18, 24, 25, 34, 43, 44, 45, 49, 51
Crataegus x media Bechst. – 24, 25, 34, 44
Crataegus monogyna Jacq. – 4, 8-10, 15-17, 22-24, 26, 29, 30, 31, 33-36, 38, 39, 40-43, 45, 46, 48, 49, 62, 67, 71
Crataegus pedicellata Sarg. – 4, 15, 17
Deutzia x rosea (Lemoine) Rehder – 44
Deutzia scabra Thunb. – 17, 18, 24-26, 35, 44
Eleagnus angustifolia L. – 16, 17, 20, 34, 44, 48
Euonymus europaeus L. – 4, 10, 15, 17, 18, 26, 32, 49
Euonymus fortunei (Turcz.) Hand.-Mazz. – 18, 25, 26, 34, 35, 43-45
Fagus sylvatica L. – 10, 11, 17, 18, 25, 53
Forsythia x intermedia Zabel – 10, 12, 17, 18, 24, 25, 34, 43-45, 51
Frangula alnus Mill. – 8, 15, 22, 23, 40, 41, 48
Fraxinus excelsior L. – 6, 10, 11, 13, 14, 15-18, 22-26, 31, 33-35, 38, 40, 41, 51, 57, 60, 68, 69, 81, 84, 85
Fraxinus pennsylvanica Marshall – 15, 17, 49
Ginkgo biloba L. – 17, 45
Gleditsia triacanthos L. – 17
Hedera helix L. – 8, 10, 11, 17, 18, 22, 25, 34, 44, 45, 51, 53, 60
Hippophaë rhamnoides L. – 16, 17, 19, 23, 34, 43, 44, 50, 52
Hydrangea macrophylla (Thunb. ex Murray) Ser. – 25, 45
Juglans regia L. – 15, 16, 19, 26, 27, 33, 43, 44, 49, 51, 69
Juniperus communis L. – 25, 34, 35, 43-45, 51
Juniperus sp. div. – 16-18, 24-26, 33-36, 43-45, 49, 51, 69
Juniperus squamata Buch.-Ham. ex Lamb. – 18, 25, 34, 35, 44, 45, 51
Laburnum anagyroides Medik. – 17, 25
Larix decidua Mill. – 10, 11, 16-18, 22, 25, 26, 33, 34, 38, 40, 43-45, 50, 53, 69
Ligustrum vulgare L. – 9, 10, 12, 15-19, 23-25, 33-35, 40, 43-45, 48, 49, 51, 62, 68
Lonicera caprifolium L. – 44
Lonicera involucrata (Richardson) Banks ex Spreng. – 43
Lonicera maackii (Rupr.) Herder – 43, 44, 49
Lonicera nitida Wils. – 45
Lonicera tatarica L. – 33, 44, 74
Magnolia kobus DC. – 45
Magnolia x soulangeana Soul.-Bod. – 25, 44
Mahonia aquifolium (Pursh) Nutt. – 10, 17, 26, 34, 44
Malus domestica Borkh. – 16, 24, 26, 36, 38, 39, 41-45, 49, 50, 54, 57, 58, 62, 68, 70, 83
Malus x purpurea Rehder – 17, 18, 25, 34, 43, 44, 51

- Malus sylvestris* (L.) Mill. – 22
Metasequoia glyptostroboides Hu et W.C. Cheng – 17, 25, 44, 45
Morus alba L. – 16, 33, 42, 50, 51, 63, 69
Padus avium Mill. – 11, 22, 23, 31, 40, 41
Padus serotina (Ehrh.) Borkh. – 8, 11, 15, 17, 22, 23, 26, 31, 40, 43-45, 48, 50, 55, 57, 58, 62
Parthenocissus inserta (A. Kern.) Fritsch – 18, 43, 44, 51
Parthenocissus quinquefolia (L.) Planch. – 10
Parthenocissus tricuspidata (Siebold et Zucc.) Planch. – 17, 25, 44
Philadelphus sp. – 12, 17, 18, 22, 24-26, 34, 35, 43, 44, 49, 51
Physocarpus opulifolius (L.) Maxim. – 17, 18, 25, 43, 51, 67
Picea abies (L.) H. Karst – 10, 11, 15-18, 22, 23, 25, 31, 34, 40, 41, 43, 44, 46, 49, 50, 52, 69
Picea glauca (Moench) Voss – 25, 45
Picea omorica (Pančić) Purk. – 18, 25, 26
Picea pungens Engelm. – 12, 13, 17, 18, 24, 25, 33-35, 37, 43-45, 48, 50
Pinus mugo Turra – 25, 35
Pinus nigra J.F. Arnold – 10, 17, 18, 25, 35, 44, 45
Pinus ponderosa Douglas ex Lawson & C. Lawson – 25
Pinus silvestris L. – 8, 11, 15, 17, 22, 23, 31, 33, 40, 41, 43, 44, 48-50, 56-58
Pinus strobus L. – 11, 17, 18, 45
Platanus ×hispanica Mill. ex Münchh. – 17, 18, 25
Platycladus orientalis (L.) Franco – 18, 25, 33-35, 43-45, 51
Populus alba L. – 17, 18, 23, 25, 26, 35
Populus ×canadensis Moench – 11, 15-18, 23, 24, 25, 31-36, 38, 40, 43, 45, 46, 48-50, 52, 57, 61, 63, 66, 67, 69, 75, 81
Populus nigra L. 'Italica' – 8, 18, 26, 32-34, 43, 49, 50, 56
Populus simonii Carrière – 17, 25, 35, 38, 45, 50, 57
Populus tremula L. – 4, 8, 9, 11, 15, 18, 23, 31, 34, 38, 40, 41, 48, 50, 59, 62, 67, 72, 84, 85
Potentilla fruticosa L. – 17, 25
Prunus cerasifera Ehrh. – 10, 17, 25, 26, 34, 35, 43, 44
Prunus domestica L. – 8, 16, 23, 38, 41, 43, 44, 49, 57, 68
Prunus mahaleb L. – 33
Prunus persica (L.) Batsch. – 34, 43, 44, 48
Prunus spinosa L. – 4, 8, 9, 11, 15, 16, 22-24, 27, 29, 30, 33, 36, 38, 39, 40-43, 45, 46, 49, 50, 52, 53, 54, 56-58, 62-64, 66-68, 70, 74, 79, 81, 83
Prunus triloba Lindl. – 17, 19, 24
Pseudotsuga menziesii (Mirb.) Franco – 10, 11, 17, 18, 23, 25, 34, 35, 43-45, 51
Ptelea trifoliata L. – 49
Pyracantha coccinea M. Roem. – 17, 18, 24-26, 35, 43, 44, 51
Pyrus communis L. – 16, 24, 44, 49, 50, 55, 69
Pyrus pyraeaster (L.) Burgsd. – 4, 9, 11, 13, 15, 17, 22, 23, 29, 30, 37, 39, 41, 43, 50, 65, 70, 71, 81
Quercus palustris Münchh. – 17
Quercus petraea (Matt.) Liebl. – 8, 15, 22, 23, 38, 48
Quercus robur L. – 4, 6, 8-11, 15-18, 22-26, 31, 33, 34, 37-39, 41-44, 48-50, 53, 57, 58, 67, 69

- Quercus rubra* L. – 8, 10, 11, 15, 17, 18, 22, 23, 45, 50, 52, 60
Rhamnus cathartica L. – 8, 15, 22, 23, 33, 40, 41, 48
Rhododendron sp. – 17, 25, 45
Rhododendron luteum Sweet – 17
Rhododendron yakushimanum Nakai – 17
Rhus typhina L. – 12, 16-18, 20, 23-25, 33, 34, 43-45, 48, 51
Ribes alpinum L. – 17, 18, 25, 33, 34, 44
Ribes aureum Pursh – 17, 33
Ribes spicatum E. Robson – 22, 40
Ribes uva-crispa L. – 17, 40, 57, 60
Robinia pseudoacacia L. – 4, 9-11, 15-18, 22-25, 35, 36, 41, 43, 44, 46, 48-51, 56, 57, 69, 76
Robinia viscosa Vent. – 23
Rosa canina L. – 4, 6, 8, 13, 15, 16, 19, 23, 24, 29, 30, 32, 33, 37-39, 40-42, 44-46, 49-51, 57, 62-65, 67, 68, 72, 74, 79
Rosa multiflora Thunb. – 49
Rosa rugosa Thunb. – 8, 18, 23-25, 34, 43, 44, 48, 51
Rosa sp. – 12, 17, 18, 25, 34, 43-45, 51
Rubus sp. – 4, 8-11, 15-18, 22-24, 31, 33, 37-39, 40-44, 46, 49, 50, 53, 54, 56-58, 60, 62-65, 68, 79, 83
Salix alba L. – 11, 15, 23, 26, 34-36, 40, 41, 43-46, 49, 50, 53, 54-56, 61, 63, 64, 67-69
Salix aurita L. – 71
Salix caprea L. – 9, 12, 13, 15, 18, 23, 36, 38, 40, 41, 48, 49, 56-58, 62
Salix cinerea L. – 41, 47-49, 58, 62
Salix fragilis L. – 11, 15, 18, 26, 40, 41, 44, 46, 49, 53, 56, 64, 69
Salix purpurea L. – 15, 23, 36, 42, 46, 49, 50, 62
Salix viminalis L. – 9, 12, 49, 62
Sambucus nigra L. – 4, 8, 9, 11-18, 22-24, 26, 27, 29-44, 46, 48, 50, 52, 53, 56, 57, 60, 62-64, 67-69, 71
Sarothamnus scoparius (L.) W.D.J. Koch – 48
Sequoiadendron giganteum (Lindl.) J. Buchholz – 8
Sorbaria sorbifolia (L.) A. Braun – 44, 51
Sorbus aria (L.) Crantz – 43, 44
Sorbus aucuparia L. emend. Hedl. – 6, 8, 10-12, 15-18, 22-26, 34, 35, 39, 40, 41, 43-46, 48, 50-53, 57, 63, 76, 80
Sorbus ×hybrida L. s. l. – 53, 63
Sorbus intermedia (Ehrh.) Pers. – 11, 12, 17, 18, 23-26, 34, 35, 43, 44, 46, 50-53, 69, 80
Spiraea japonica L. – 17, 35, 43-45
Spiraea nipponica Maxim. – 49
Spiraea ×pseudosalicifolia Silverside – 43, 44, 48, 84
Spiraea ×vanhouttei (Briot) Zabel – 10, 11, 17, 18, 24-26, 33-35, 44, 45, 49, 51
Symphoricarpos albus (L.) S.F. Blake – 17, 18, 23, 25, 34, 43, 44, 48, 51
Symphoricarpos ×chenaultii Rehder – 17, 25, 44, 51
Syringa vulgaris L. – 10-12, 16, 18, 33, 43-45, 50, 51, 62
Tamarix tetrandra Pall. ex M. Bieb. – 10, 18, 25, 34, 43, 44, 49, 51
Taxodium distichum (L.) Rich. – 25
Taxus baccata L. – 17, 25, 45

- Taxus ×media* Rehder – 17, 25, 34, 43, 44, 45, 50, 51
Thuja occidentalis L. – 17, 18, 23-25, 33, 34, 43-45, 49-51, 61, 69
Tilia americana L. – 25
Tilia cordata Mill. – 6, 8, 10-19, 23-26, 34, 35, 38, 43-46, 48-53, 55, 60, 69, 76, 84, 85
Tilia platyphyllos Scop. – 6, 10-12, 14, 17-19, 23-26, 34, 35, 43, 44, 52, 53, 60, 69
Tilia tomentosa Moench – 17
Ulmus glabra Huds. – 11, 17, 18, 23, 25, 45
Ulmus ×hollandica Mill. – 15, 16, 24, 49, 56
Ulmus laevis Pall. – 6, 10, 11, 15, 17-19, 22-25, 33, 34, 40, 41, 43, 50, 53, 56, 57, 60, 81
Ulmus minor Mill. emend. Richens – 9, 16, 17, 23, 38, 54
Viburnum lantana L. – 17, 44
Viburnum opulus L. – 33
Viburnum ×rhytidophylloides J.V. Suringar – 17
Vitis coignetiae Pulliat ex Planch. – 51
Vitis vinifera L. – 18, 44, 51
Weigela sp. – 17

Analysis of dendroflora

Groups of species of different geo-historical origin

The species composition of dendroflora of the town of Jarocin is dominated by anthropophytes (132 species), constituting 72.1% of the total number. The other 27.8% was composed of native species – non-synanthropic spontaneophytes and apophytes (51 species).

Among anthropophytes, diaphytes predominated, with 103 species, and accounted for 78% of the total number of anthropophytes. Kenophytes ranked second – 21.9% (29 species). In the total dendroflora of Jarocin diaphytes accounted for over 56%, while kenophytes for 16%, respectively (Fig. 2).

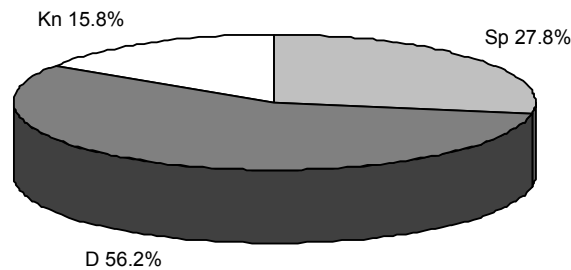


Fig. 2. Percentage of the occurrence of species groups of various historical-geographical (D – diaphytes, Sp – spontaneophytes, Kn – kenophytes)

Ryc. 2. Udział procentowy grup gatunków o różnym pochodzeniu historyczno-geograficznym (D – diafity, Sp – spontaneofity, Kn – kenofity)

Socio-ecological groups of species

Dendroflora of Jarocin may be divided into two groups of species. One is composed of plants with a specific position in the variation of the vegetation cover in Poland (Table 1). This pertains primarily to spontaneophytes, but also to a small segment of alien species, coming mainly from Asia and North America. Within this group 35 species originate from fertile deciduous forests and scrubs (in the phytosociological sense they include orders *Phagetalia* and *Prunetalia*). A considerable role is also played by species of oak forests, coniferous forests, alder swamp forests, riverine bushes, treeless low-moors, transitional moors and raised bogs (a total of 22 species). The presence of these plants in Jarocin is connected with semi-natural habitats. The other group of trees and shrubs in Jarocin are alien taxa (diaphytes – planted species), for which no position may be identified in the variation of vegetation of Poland. They predominate in the analysed pool of species and constitute over 66% of all dendroflora.

Table 1
Participation of socio-ecological groups in the dendroflora of Jarocin
Udział grup socjologiczno-ekologicznych w dendroflorze Jarocina

Socio-ecological group Grupa socjologiczno-ekologiczna	Number of species Liczba gatunków	Percentage Udział procentowy
Fertile deciduous forests and shrub communities Żyzne lasy liściaste i zbiorowiska krzewiaste	35	19.1
Acidophilous oak forests, clear oak forests, mixed forests and their substitutes: meadow and grassland communities Kwaśne lasy dębowe, świetliste dąbrowy, bory mieszane oraz zastępcze dla nich zbiorowiska porębowe, łąkowe i murawowe	12	6.5
Boggy alder forests, treeless low, transitional and high peat bogs Bagniste olszyny, bezdrzewne torfowiska niskie, przejściowe i wysokie	5	2.7
Waterside forests and thickets, rush and water communities Lasy i zarośla nadbrzeżne, zbiorowiska szuwarowe i wodne	5	2.7
Nitrophilous thicket and boundary forest communities Nitrofilne zbiorowiska zaroślowe i okrajkowe	4	2.2
Therophilous communities Zbiorowiska terofityczne	1	0.5
Species with undefined phytosociological status Gatunki o nieokreślonej przynależności fitosocjologicznej	121	66.1

Groups of species in terms of taxonomy

In the analysed pool of plants a total of 183 species were found, including 1 subspecies and 16 hybrids. The recorded taxa represent 40 families. The most numerous among them was family Rosaceae with 45 species, which constitutes approx. 24.4% analysed flora. Families Salicaceae – 16 species, i.e. 8.7%, and Pinaceae – 14 species

(7.65%) ranked next. In the investigated pool of plants 13 families represented by one species were reported. Trees and shrubs of Jarocin belong to 85 genera, among which taxa having one species predominate (46). The following genera are most numerous in terms of the number of species: *Prunus* – 10, *Salix* – 8, *Populus* – 8, *Acer* – 7, *Berberis* – 6, *Pinus* – 5, and *Picea* – 4.

Frequency of tree and shrub species

Analysis of frequency of occurrence (Table 2) of trees and shrubs in the town showed that the most numerous group were very rare species. They accounted for over 48% total dendroflora. In this group there are plants which may be considered floristic curiosities of the town, e.g. *Chamaecyperis pisifera* and *Ch. nootkatensis*, *Ginkgo biloba*, *Gleditsia triacanthos*, *Quercus palustris*, *Robinia viscosa* or *Tilia americana* and *T. tomentosa*, etc.

Table 2

**Frequency of tree and shrubs species in Jarocin
Frekwencja gatunków drzew i krzewów Jarocina**

Frequency Klasa częstości	Percentage of occurrence in squares Procent wystąpień w kwadratach	Species no. Liczba gatunków	Percentage of total dendroflora Procent udziału w całej dendroflorze
Very rare Bardzo rzadkie	≤ 5	89	48.63
Rare Rzadkie	6-10	36	19.67
Moderately frequent Umiarkowanie częste	11-20	30	16.39
Frequent Częste	21-30	15	8.19
Very frequent Bardzo częste	31-40	7	3.82
Common Pospolite	> 40	6	3.28

Spatial variation of the abundance of dendroflora at the level of primary plots

When analysing the number of species in individual squares (the lower number in the square Fig. 1, Table 3), a considerable variation may be noticed in terms of their abundance in different parts of town. The biggest number of species (99) was recorded in square 17, which covers the largest part of the municipal park, between the following streets: Kwiatowa, Słoneczna, Kasztanowa, Lipowa and Do Zdroju, as well as a fragment of a housing estate at Kasztanowa Street. Square 25, where a total of 83 species were recorded, covers the southern part of the park, the market with adjacent little streets, as well as the following streets: Poznańska, Aleje Niepodległości, Kościuszki, Śródmiejska, Świętego Ducha, Paderewskiego, together with the green around Św. Marcina

Table 3

Richness of dendroflora with reference to basic squares
Bogactwo dendroflory na poziomie kwadratów podstawowych

Category Kategoria	Number of species in a square Liczba gatunków w kwadracie	Number of squares Liczba kwadratów	Percentage Udział procentowy
Very poor Bardzo ubogie	0-5	31	36.47
Poor Ubogie	6-10	14	16.47
Moderately poor Średnio ubogie	11-20	14	16.47
Moderately rich Średnio bogate	21-30	6	7.06
Rich Bogate	31-40	10	11.76
Very rich Bardzo bogate	> 40	10	11.76

and Chrystusa Króla churches, rich in plant species. 84 species were reported in square 44. This square covers the biggest housing estate in Jarocin, called “osiedle Konstytucji 3 Maja”, as well as blocks of flats on Traugutta, Wojska Polskiego and Piaskowa Streets, together with Bema, Marii Curie-Skłodowskiej and Świerczewskiego Streets. A large section of a productive forest and three cemeteries are located within square 23. A total of fifty species were recorded in that square. No dendrological specimens investigated in this study were found in 11 squares. These parts of the town are covered by cultivated fields and estates of detached houses.

Trees being nature monuments

There are 72 trees in Jarocin, which – according to the standards given by **Majdecki** (1993) – reached the dimensions of a nature monument or were approaching them, as well as two nature monuments recorded in the register of nature conservation objects for the Town and District of Jarocin, which are marked with appropriate plates. These include two small-leaved lime trees (*Tilia cordata*), growing next to Św. Marcina church at the Market Square (nos. 16 and 17). Table 4 presents a list of trees with dimensions of nature monuments.

Table 4

**List of trees of dimensions of nature monuments
Wykaz drzew o wymiarach pomnikowych**

No Lp.	Taxa Taksony	Tree girth Obwód drzewa (cm)	No of squares Nr kwadratu
1	2	3	4
1	<i>Quercus robur</i>	389	43
2	<i>Quercus robur</i>	346	43
3	<i>Quercus robur</i>	329	50
4	<i>Quercus robur</i>	452	22
5	<i>Ulmus laevis</i>	292	85
6	<i>Ulmus laevis</i>	275	85
7	<i>Ulmus laevis</i>	382	85
8	<i>Ulmus laevis</i>	368	85
9	<i>Ulmus laevis</i>	266	85
10	<i>Ulmus laevis</i>	234	85
11	<i>Quercus robur</i>	320	23
12	<i>Quercus robur</i>	384	42
13	<i>Quercus robur</i>	351	42
14	<i>Quercus robur</i>	460	18
15	<i>Quercus robur</i>	475	17
16	<i>Tilia cordata</i>	368	25
17	<i>Tilia cordata</i>	358	25
18	<i>Fraxinus excelsior</i>	448	25
19	<i>Ulmus laevis</i>	228	10
20	<i>Ulmus laevis</i>	279	10
21	<i>Ulmus laevis</i>	212	10
22	<i>Ulmus laevis</i>	270	18
23	<i>Ulmus laevis</i>	223	18
24	<i>Ulmus laevis</i>	269	25
25	<i>Quercus robur</i>	301	17
26	<i>Populus alba</i>	429	17
27	<i>Fagus sylvatica</i>	322	17
28	<i>Prunus avium</i>	141	17
29	<i>Prunus avium</i>	137	17
30	<i>Prunus avium</i>	106	17
31	<i>Tilia cordata</i>	350	17

Table 4 – cont.

1	2	3	4
32	<i>Quercus robur</i>	333	17
33	<i>Fagus sylvatica</i>	337	18
34	<i>Fagus sylvatica</i>	319	18
35	<i>Quercus robur</i>	353	17
36	<i>Quercus robur</i>	302	17
37	<i>Acer campestre</i>	209	17
38	<i>Quercus robur</i>	330	18
39	<i>Pinus nigra</i>	263	17
40	<i>Quercus rubra</i>	351	17
41	<i>Pseudotsuga menziesii</i>	255	11
42	<i>Quercus rubra</i>	353	11
43	<i>Quercus rubra</i>	320	11
44	<i>Aesculum hippocastanum</i>	323	25
45	<i>Quercus robur</i>	445	25
46	<i>Populus ×canadensis</i> ‘Serotina’	393	25
47	<i>Populus ×canadensis</i> ‘Marylandica’	410	25
48	<i>Fraxinus excelsior</i>	332	25
49	<i>Ulmus laevis</i>	313	25
50	<i>Ulmus laevis</i>	220	25
51	<i>Ulmus laevis</i>	251	25
52	<i>Ulmus laevis</i>	281	25
53	<i>Tilia cordata</i>	290	17
54	<i>Fraxinus excelsior</i>	251	11
55	<i>Tilia cordata</i>	272	17
56	<i>Tilia cordata</i>	277	10
57	<i>Tilia cordata</i>	320	10
58	<i>Fraxinus excelsior</i>	326	17
59	<i>Fraxinus excelsior</i>	312	17
60	<i>Acer campestre</i>	486	17
61	<i>Quercus robur</i>	424	17
62	<i>Quercus robur</i>	471	17
63	<i>Platanus ×hispanica</i> ‘Acerifolia’	322	17
64	<i>Platanus ×hispanica</i> ‘Acerifolia’	342	17
65	<i>Fagus sylvatica</i>	318	17
66	<i>Quercus robur</i>	640	17

Table 4 – cont.

1	2	3	4
67	<i>Acer campestre</i>	219	17
68	<i>Acer pseudoplatanus</i>	209	17
69	<i>Acer platanoides</i>	279	17
70	<i>Fraxinus excelsior</i>	398	17
71	<i>Fraxinus excelsior</i>	300	17
72	<i>Acer platanoides</i>	277	17
73	<i>Acer platanoides</i>	208	17
74	<i>Acer platanoides</i>	215	17

Conclusions

1. In Jarocin a total of 183 tree and shrub species were recorded, including 16 hybrids and four varieties, belonging to 40 families (of which the most numerous was Rosaceae) and 85 genera (the richest were *Prunus*, *Salix*, *Populus*, *Acer*). One species is covered by strict legal protection (*Hedera helix*) and two species – by partial protection: *Frangula alnus* and *Viburnum opulus*.

2. A vast majority of reported plants are alien species (anthropophytes), out of which 56% are species, which are not permanently settled (planted diaphytes).

3. The dendroflora of the town is represented by 121 species, for which it was impossible to indicate natural or anthropogenic plant communities in Poland. The most numerous group are representatives of fertile deciduous forests and shrub communities (35 species).

4. In the dendroflora of Jarocin the biggest number of species were very rare species – 48.6%. Common species accounted for as little as 3.3%.

5. The spatial distribution of dendroflora in the territory of the town is not uniform. The Municipal Park and the other public green areas in nine squares are richest in species (99).

6. The condition of dendroflora is good, as it is manifested by the prepared list of 72 trees with dimensions of nature monuments.

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DENDROFLORA MIASTA JAROCIN

Streszczenie

W pracy przedstawiono wyniki badań aktualnego stanu dendroflory na terenie miasta Jarocin w jego administracyjnych granicach. Stwierdzono występowanie 183 gatunków, w tym 16 mieszańców, oraz cztery odmiany należące do 85 rodzajów i 40 rodzin (najliczniejsza – Rosaceae).

Zdecydowana większość roślin to gatunki obcego pochodzenia, z których ponad 70% to diafity sadzone. Dendroflorę reprezentuje 121 gatunków, dla których nie można wskazać naturalnych lub antropogenicznych zbiorowisk roślinnych Polski i 35 gatunków charakterystycznych dla żyznych lasów liściastych i zbiorowisk krzewiastych. W obrębie puli drzew i krzewów najczęściej (48,6%) jest gatunków bardzo rzadkich, które można uznać za osobliwości florystyczne miasta, m.in.: *Chamaecyperis pisifera* i *Ch. nootkatensis*, *Ginkgo biloba*, *Gleditsia triacanthos*, *Quercus palustris*, *Robinia viscosa*, *Tilia americana*, *T. tomentosa* i inne. Ogólny stan dendroflory jest dobry. 72 drzewa należące do 12 gatunków i dwóch kultywarów osiągnęły wymiary drzew pomnikowych.

Authors' address:

Małgorzata Klimko¹, Grzegorz Kaczmarek², Katedra Botaniki, Akademia Rolnicza im. Augusta Cieszkowskiego w Poznaniu, ul. Wojska Polskiego 71 C, 60-625 Poznań, Poland, e-mail: klim@au.poznan.pl¹,