

Aesthetic aspects of plant communities of ruderal urban sites in Szczecin

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Abstract. Synanthropization of plant cover, connected with urban development, contributes to the appearance of specialized ruderal plant communities, adapted to habitats exposed to human influence. A lot of published data have focused on urban flora, but the aesthetic aspect of perennial and temporary plant communities at urban sites has been frequently omitted. Currently the practical use of such plant communities is limited by the lack of descriptive information available. In this study great attention has been paid to variability of urban communities, defined by: aesthetic aspects, flowering period, and colour variability in flowering communities. In Szczecin, *Artemisio-Tanacetetum vulgaris*, *Calamagrostietum epigeji*, *Daucu-Picridetum hieracioidis*, and *Rudbeckio-Solidaginetum* have been recognized as especially decorative. They could be used to reduce the costs of establishing and maintaining urban green areas.

Key words: urban sites, ruderal vegetation, flowering aspects, flower colour

1. Introduction

In recent years, intensive human management has exerted a significant effect on landscape. Rapid urban development plays a major role in habitat degradation, linked with shortage and salinity of water, soil degradation, air pollution, and mechanical damage. It leads to the development of nitrophilous communities, tolerant to stressful urban conditions (Kim *et al.* 2002; Wojcieszczuk 1980). Habitats like waysides, slopes of railway tracks and roads, banks of watercourses, undeveloped plots in the city centre and suburbs, or wastelands, are commonly occupied by the well-adapted and resistant ruderal urban communities (Janecki 1983; Sudnik-Wójcikowska 1992; Chmiel 1993; Juśkiewicz-Swaczyna & Endler 2003; Chyliński & Fornal 2005). Currently the aesthetic and ecological values of such plant communities are indiscernible and underestimated. However, colourful flowering plant communities in cities have a positive influence on human senses. The high diversity of plants and its colour variability may arouse aesthetic feelings and respect for local flora. Many studies have concentrated on analyzing urban flora but only few have paid attention to their aesthetic aspect.

The presented study brings a fresh view of possible ornamental use of some ruderal urban communities, distinguished by rich species composition, intensity and colour variability, long flowering period, and adaptation to difficult conditions.

2. Materials and methods

The field research was conducted during the growing season in 2005 in Szczecin. Nine potentially attractive ruderal urban communities, in respect of being floriferous, were localized and identified. The plots were situated within the city boundaries and characterized by various degrees of human pressure: earthworks, rubble heaps, embankments, treaded areas, or areas subject to ploughing and mechanical damage.

At the selected plots we recorded all plant species, with their cover-abundance and sociability recorded on the Braun-Blanquet scale, and next we identified and classified the analyzed phytocoenoses (Matuszkiewicz 2006). The species names follow the works of Mirek *et al.* (2002) and Rutkowski (2004).

The present study was largely based on weekly observations, during which we completed and checked the

Table 2. Flowering aspect of *Calamagrostietum epigeji*

Species	Cover-sociability	Flower colour	Extent of flowering period (2005)									
			05.07.	12.07.	22.07.	01.08.	13.08.	24.08.	30.08.	12.09.	26.09.	08.10.
<i>Calamagrostis epigejos</i>	4.5	purple/straw	[Timeline bar from 05.07 to 08.10]									
<i>Solidago canadensis</i>	2.2	yellow	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Solidago altissima</i>	1.3	yellow	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Potentilla reptans</i>	1.3	yellow	[Timeline bar from 05.07 to 26.09]									
<i>Achillea millefolium</i>	1.2	white	[Timeline bar from 12.07 to 26.09, with 'buds' label from 12.07 to 22.07]									
<i>Tanacetum vulgare</i>	1.2	yellow	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Artemisia vulgaris</i>	+		[Timeline bar from 05.07 to 26.09]									
<i>Cirsium arvense</i>	+	pink	[Timeline bar from 05.07 to 26.09]									
<i>Helianthus tuberosus</i>	+	yellow	[Timeline bar from 24.08 to 08.10, with 'buds' label from 24.08 to 30.08]									
<i>Symphytum officinale</i>	+	purple	[Timeline bar from 05.07 to 12.07]									

attractive period in the community. Although *Helianthus tuberosus*, *Solidago canadensis*, and *Sonchus arvensis* are still blooming, it does not improve the appearance of the whole plot.

***Calamagrostietum epigeji* Juraszek 1928**

This community is found in an area devastated for a long time. The plot is located in a sheltered and dry spot, distant from roads. The community consists of 10 tall perennial species, among which *Calamagrostis epigejos* is the dominant and creates a dense stand. The participation of *Solidago canadensis* s.s. and *Solidago canadensis* var. *scabra* (*S. altissima*), which are characteristic species of *Rudbeckio-Solidaginetum* community, is also conspicuous. *Helianthus tuberosus* has been observed occasionally. It reaches the optimum stage of development in late summer.

This community is distinguished by the late aesthetic expression, among which 2 colours co-dominate: the green of foliage and yellow of *Solidago* inflorescences (Table 2).

Colour stages:

Green – from 7th July to 24th August. This effect is created by dark green, long *Calamagrostis epigejos* leaves and light green *Solidago canadensis* tussocks. At the beginning of August the green community colour is diversified by flowering companion species: white

inflorescences of *Achillea millefolium* and yellow of *Tanacetum vulgare*. At the end of August most of *S. canadensis* flower buds turn yellow.

Green and yellow – from 24th August to 12th September. The plot is very attractive because of colour intensity. The dominant colour is the yellow of *Solidago canadensis* inflorescences and light green leaves. The spindle-like, light purple panicles of *Calamagrostis epigejos* overlook the tall and dense stand. Later, the latter species turns straw-coloured, while the former continues flowering yellow.

Since 26th September, *Calamagrostietum epigeji* loses its decorative value. The only bright and colourful element in the plot is created by the tall, yellow inflorescences of *Helianthus tuberosus*.

***Dauco-Picridetum hieracioidis* (Fab. 1933) Görs 1966**

This community grows on a gentle, sunny slope and consists of 14 species. The co-dominant *Cichorium intybus* and *Daucus carota* create a field-patch structure. The phytocenosis is represented mostly by perennial species, although *D. carota* is a biennial plant.

During our observations, the community was dominated by whiteness of *Daucus carota* and light blue of *Cichorium intybus* (Table 3).

Colour stages:

Table 3. Flowering aspect of *Dauco-Picridetum hieracioidis*

Species	Cover-sociability	Flower colour	Extent of flowering period (2005)									
			05.07.	12.07.	22.07.	01.08.	13.08.	24.08.	30.08.	12.09.	26.09.	08.10.
<i>Cichorium intybus</i>	3.4	blue	[Timeline bar from 05.07 to 26.09]									
<i>Daucus carota</i>	3.3	white	[Timeline bar from 05.07 to 26.09]									
<i>Lolium perenne</i>	1.2		[Timeline bar from 05.07 to 26.09]									
<i>Artemisia vulgaris</i>	1.1		[Timeline bar from 05.07 to 26.09]									
<i>Sonchus arvensis</i>	1.1	yellow	[Timeline bar from 05.07 to 26.09]									
<i>Taraxacum officinale</i>	+		[Timeline bar from 05.07 to 26.09]									
<i>Erigeron annuus</i>	+	white	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Melilotus officinalis</i>	+	yellow	[Timeline bar from 05.07 to 26.09]									
<i>Plantago lanceolata</i>	+		[Timeline bar from 05.07 to 26.09]									
<i>Solidago altissima</i>	+	yellow	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Tanacetum vulgare</i>	+	yellow	[Timeline bar from 12.07 to 26.09, with 'buds' label from 22.07 to 30.08]									
<i>Trifolium repens</i>	+	white	[Timeline bar from 05.07 to 26.09]									

Cichorium intybus, *Echium vulgare*, *Knautia arvensis*, *Medicago sativa*).

Yellow – from 30th August to 8th October. It is characterized by intensive yellow flowers of *Solidago canadensis* and scanty white flowers of other species. In mid-September the yellow colour of *S. canadensis* gets darker, and in October it turns light brown.

4. Discussion

Currently, most of the society perceive ruderal urban plants as common weeds and do not appreciate their stability and aesthetic value. In cities usually only predictable and repeatable ornamental plants are cultivated, which are quite often not resistant to changeable environmental conditions. This study shows that places under strong human pressure could be sown or planted with species compositions that form ruderal urban communities.

The best places for such natural flowerbeds are open spaces in parks or landscape gardens, on the outskirts of towns, in the immediate vicinity of houses, roundabouts, or along public transport routes (Sowa 1964; Wróbel 2006). Janecki (1983) mentions *Artemisio-Tanacetum vulgaris* and *Rudbeckio-Solidaginetum* communities as useful in urban space on account of aesthetic value. Similarly, Wysocki and Sikorski (2009) point out the value of *Rudbeckio-Solidaginetum* for its aesthetic aspects in landscape architecture. The presented study confirms this view through observations of abundant and long-term flowering of *Solidago canadensis*. The

community *Rudbeckio-Solidaginetum* is floristically rich, consisting of numerous profusely blooming species. Janecki (1983) noted that *Echium vulgare*, *Melilotus alba*, and *Oenothera biennis* in their structure and colour resemble flower beds. He recommended this community for use in urban architecture and mowing once in autumn.

The community *Artemisio-Tanacetum vulgaris* overgrows rural and urban neglected lawns (Wysocki & Sikorski 2009). In Szczecin it occurred in an area neglected for a long time, near Mieszka I Street. Many authors (Sowa 1964; Zajac 1974; Janecki 1983; Matuszkiewicz 2006; Wysocki & Sikorski 2009) state that it is dominated by *Tanacetum vulgare* and a number of sporadic species. Janecki suggested using that community in urban areas on account of its aesthetic value (long-term blooming – July to September) as well as low cost (mowing once a year). However, *Artemisio-Tanacetum vulgaris* may produce allergic reactions due to *Artemisia* species.

Moreover, to create stable patches of *Artemisio-Tanacetum vulgaris* and *Rudbeckio-Solidaginetum*, a few growing seasons are needed.

Aside from stable perennial vegetation, a great role is played by flowering plant communities consisting of annuals and biennials, e.g. *Dauco-Picridetum hieracioidis*, which perfectly suits in the needs of urban green areas and can be introduced and maintained at low cost (sowing and mowing once a year).

Acknowledgements. I would like to thank Dr S. Jurzyk for necessary help and inspiration.

References

- CHMIEL J. 1993. Flora roślin naczyniowych wschodniej części Pojezierza Gnieźnieńskiego i jej antropogeniczne przeobrażenia w wieku XIX i XX, cz. 1 i 2. Prace Zakładu Taksonomii Roślin UAM w Poznaniu 1; 1: 1-202, 2: 1-212. Wyd. Sorus, Poznań.
- CHYLIŃSKI W. & FORMAL B. 2005. Plant cover characteristic of closed viaducts in Warsaw. *Annals of Warsaw Agriculture University, SGGW* 26: 73-81
- JANECKI J. 1983. Człowiek a roślinność synantropijna na podstawie Warszawy. *SGGW-AR*, Warsaw, pp. 6-58.
- JUŚKIEWICZ-SWACZYNA B. & ENDLER Z. 2003. Flora synantropijna Brodnicy. 37 pp. Wyd. UW-M, Olsztyn.
- KIM Y-M., ZERBE S. & KOWARIK I. 2002. Human impact on flora and habitats in Korean rural settlements. *Preslia*, Praha 74: 407-419.
- MATUSZKIEWICZ W. 2006. Przewodnik do oznaczania zbiorowisk roślinnych Polski. In: J. B. FALIŃSKI (ed.), *Vademecum Geobotanicum* 3, 537 pp. Wyd. Nauk. PWN, Warszawa.
- MIREK Z., PIĘKOŚ-MIRKOWA H., ZAJAC A. & ZAJAC M. 2002. Flowering plants and pteridophytes of Poland. A checklist. In: Z. MIREK (ed.). *Biodiversity of Poland* 1, 442 pp. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.
- RUTKOWSKI L. 2004. Klucz do oznaczania roślin naczyniowych Polski niżowej. Wyd. II, popr. i unowocześnione, 814 pp. Wyd. Nauk. PWN, Warszawa.
- SOWA R. 1964. Roślinne zespoły ruderalne na terenie Łodzi, pp. 10-21. Łódzkie Towarzystwo Naukowe, Łódź.
- SUDNIK-WÓJCİKOWSKA B. 1992. Studies of flora synanthropization. *Flora* 187: 37-50.
- WOJCIESZCZUK T. 1980. Ocena stopnia zasolenia gleb miejskich solami chlorkowymi i ich oddziaływanie na

- drzewa oraz możliwości zapobiegania skutkom nadmiernej akumulacji soli. AR, Szczecin. pp. 1-26.
- WRÓBEL M. 2006. Origin and spatial distribution of roadside vegetation within the forest and agricultural areas in Szczecin lowland. *Pol. J. Ecol.* 54: 137-144.
- WYSOCKI Cz. & SIKORSKI P. 2009. Fitosocjologia stosowana w ochronie i kształtowaniu krajobrazu. 498 pp. Wyd. SGGW, Warszawa.
- ZAJĄC E. 1974. Ruderal vegetation of the Bielsko-Biała town. *Monogr. Bot.* 40: 1-87.