

# Threatened segetal flora species of the Łódź Heights

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**Abstract:** The paper presents the results of floristic investigations of the threatened segetal plants of the Łódź Heights. In the course of the studies, 59 such species have been recorded. They constitute 18.2% of the segetal flora of this mesoregion and represent the following threat categories: CR (Critically Endangered) – 1 species, EN (Endangered) – 13 species, VU (Vulnerable) – 31 species, LC (Lower Risk) – 8 species, DD (Data Deficient) – 6 species.

**Key words:** environment, human impact, plant cover, vegetation and segetal flora, threatened species of segetal plants, Łódź Heights

## 1. Introduction

The flora of cultivated fields located in the Łódź Heights (Warcholińska 1993) is now undergoing abrupt transformations due to changes in the way human impact affects field environment. This results not only from the modernization and intensification of agriculture, but also from an increase in the degree and extent of mechanization of agriculture and devastation of natural environment. This process, beside the phenomenon of the expansion of certain species, is accompanied by the phenomenon of the recession of many segetal plant species.

Numerous facts connected with the decreasing number and size of sites and abundance of the populations of numerous species of the Łódź Heights segetal flora brought up the necessity of estimating the present resources of rare and threatened species of segetal plants of this region. According to the established principles of species protection, which have been accepted by the Committee of Endangered Species Conservation of the International Union for the Conservation of Nature and Natural Resources (Głowaciński 1997; IUCN 1994), an attempt has been made to determine the degree (status) and causes of threat to such species and conditions and possibilities of their conservation. Besides, they served to compile a valid list of presently threatened species of the segetal flora of the Łódź Heights.

## 2. Research area and methods

The Łódź Heights, which are 1648 km<sup>2</sup> in area, are located in central Poland. The mesoregion of the Łódź

Heights belongs to the macroregion of the South-Mazovian Heights, which are included in the sub-province of Mid-Poland Lowlands (Kondracki 1977). The study area is located within the Łódź-Piotrków District of the Section of Northern Marginal Uplands and Subdivision of the Belt of the Central Highlands (Szafer 1972; Szafer & Pawłowski 1972).

The contemporary landscape of the Łódź Heights is a result of various morphogenetic processes that have been occurring in the area since the glacial period, through the periglacial up to the contemporary, Holocene one. The marginal zone of the Łódź Heights is a place where numerous streams and rivers, such as the Bzura, Moszczenica and Mrożyca, originate.

The attractiveness of the landscape of the Łódź Heights first of all manifests in the relatively high relative altitudes, considerable gradients of slope surfaces, presence of interesting valley and slope forms and numerous phenomena of contemporary erosion.

The rich geological past of the area has affected the development of various geomorphological forms (ravines, gorges, denundation forms and others). The value of the Łódź Heights also consists in their cultural assets that are common there, e.g. The Franciscan Monastery at Łagiewniki, classicist manor house at the Byszewy village, early middle-ages fortified settlement in the village of Skoszewy (Andrzejewski & Kurowski 2002).

Material for the detailed analysis of the properties of the group of 59 threatened species of the segetal flora of the Łódź Heights constitutes the results of own observations and data obtained from the literature, first

**Table 1.** List of threatened species of segetal flora of the Łódź Heights

| Species                                                             | Category of threat |    |    |    |    |
|---------------------------------------------------------------------|--------------------|----|----|----|----|
|                                                                     | CR                 | EN | VU | LR | DD |
| <i>Acinos arvensis</i> (Lam.) Dandy                                 |                    |    |    |    | +  |
| <i>Agrostemma githago</i> L.                                        |                    |    | +  |    |    |
| <i>Alyssum alyssoides</i> (L.) L.                                   |                    |    |    |    | +  |
| <i>Anagallis foemina</i> Mill.                                      |                    |    | +  |    |    |
| <i>Anchusa arvensis</i> (L.) M. Bieb.                               |                    |    |    | +  |    |
| <i>Aphanes inexpectata</i> W. Lippert                               |                    |    | +  |    |    |
| <i>Avena strigosa</i> Schreb.                                       |                    |    |    | +  |    |
| <i>Bromus arvensis</i> L.                                           |                    | +  |    |    |    |
| <i>Bromus secalinus</i> L.                                          |                    |    | +  |    |    |
| <i>Camelina microcarpa</i> Andr.                                    |                    |    | +  |    |    |
| <i>Camelina sativa</i> (L.) Crantz                                  |                    | +  |    |    |    |
| <i>Campanula rapunculoides</i> L.                                   |                    |    |    | +  |    |
| <i>Centaurea cyanus</i> L.                                          |                    |    | +  |    |    |
| <i>Centunculus minimus</i> L.                                       |                    |    | +  |    |    |
| <i>Chaenorhynchus minus</i> (L.) Lange                              |                    |    | +  |    |    |
| <i>Chenopodium polyspermum</i> L.                                   |                    |    |    | +  |    |
| <i>Consolida regalis</i> Gray                                       |                    |    | +  |    |    |
| <i>Coronopus squamatus</i> (Forssk.) Asch.                          |                    | +  |    |    |    |
| <i>Digitaria sanguinalis</i> (L.) Scop.                             |                    |    | +  |    |    |
| <i>Euphorbia exigua</i> L.                                          |                    | +  |    |    |    |
| <i>Filago arvensis</i> L.                                           |                    |    | +  |    |    |
| <i>Falcaria vulgaris</i> Bernh.                                     |                    |    |    | +  |    |
| <i>Fumaria officinalis</i> L.                                       |                    |    |    | +  |    |
| <i>Fumaria vaillantii</i> Loisel.                                   |                    | +  |    |    |    |
| <i>Gagea pratensis</i> (Pers.) Dumort.                              |                    |    | +  |    |    |
| <i>Galium spurium</i> L.                                            |                    |    | +  |    |    |
| <i>Gnaphalium luteo-album</i> L.                                    |                    |    | +  |    |    |
| <i>Herniaria glabra</i> L.                                          |                    |    |    |    | +  |
| <i>Herniaria hirsuta</i> L.                                         |                    |    | +  |    |    |
| <i>Holosteum umbellatum</i> L.                                      |                    |    | +  |    |    |
| <i>Hypericum humifusum</i> L.                                       |                    |    | +  |    |    |
| <i>Illecebrum verticillatum</i> L.                                  |                    | +  |    |    |    |
| <i>Juncus capitatus</i> Weigel                                      |                    |    | +  |    |    |
| <i>Lathyrus tuberosus</i> L.                                        |                    |    | +  |    |    |
| <i>Lolium remotum</i> Schrank.                                      | +                  |    |    |    |    |
| <i>Medicago falcata</i> L.                                          |                    |    |    |    | +  |
| <i>Melandrium noctiflorum</i> (L.) Fr.                              |                    |    | +  |    |    |
| <i>Misopates orontium</i> (L.) Raf.                                 |                    | +  |    |    |    |
| <i>Myosotis discolor</i> Pers.                                      |                    |    | +  |    |    |
| <i>Myosurus minimus</i> L.                                          |                    |    | +  |    |    |
| <i>Neslia paniculata</i> (L.) Lesr.                                 |                    |    | +  |    |    |
| <i>Ornithogalum umbellatum</i> L.                                   |                    |    |    | +  |    |
| <i>Papaver dubium</i> L.                                            |                    |    |    | +  |    |
| <i>Papaver rhoeas</i> L.                                            |                    |    | +  |    |    |
| <i>Peplis portula</i> L.                                            |                    |    | +  |    |    |
| <i>Polycnemum arvense</i> L.                                        |                    | +  |    |    |    |
| <i>Radiola linoides</i> Roth                                        |                    |    | +  |    |    |
| <i>Ranunculus arvensis</i> L.                                       |                    | +  |    |    |    |
| <i>Ranunculus sardous</i> Crantz                                    |                    |    | +  |    |    |
| <i>Saxifraga tridactylites</i> L.                                   |                    | +  |    |    |    |
| <i>Sedum maximum</i> (L.) Hoffm.                                    |                    |    |    |    | +  |
| <i>Silene gallica</i> L.                                            |                    |    | +  |    |    |
| <i>Sinapis arvensis</i> L.                                          |                    |    | +  |    |    |
| <i>Spergula arvensis</i> L. subsp. <i>maxima</i> (Weihe) O. Schwarz |                    | +  |    |    |    |
| <i>Stachys annua</i> (L.) L.                                        |                    | +  |    |    |    |
| <i>Valerianella ramosa</i> Bastard                                  |                    | +  |    |    |    |
| <i>Valerianella dentata</i> (L.) Pollich                            |                    |    | +  |    |    |
| <i>Veronica opaca</i> Fr.                                           |                    |    | +  |    |    |
| <i>Veronica polita</i> Fr.                                          |                    |    |    | +  |    |

of all from the studies of Warcholińska (1986-1987, 1993) and Zarzycki & Szela (1992).

Following the principle of uniformity of criteria for the assessment of the degree of threat, the categories of the International Union of for the Conservation of Nature and Natural Resources were applied, namely: CR – critically endangered species, EN – endangered species, VU – vulnerable species, LR – lower risk species, DD – data deficient species.

The ascription of a taxon to a given threat category is based, according to the International Union for the Conservation of Nature and Natural Resources, on quantitative and qualitative criteria (cf eg. Czyżewska 1998; Głowaciński 1997; IUCN 1999; Kaźmierczakowa & Zarzycki 2001). The botanical nomenclature was accepted after Mirek *et al.* (2002).

### 3. Results

The list of threatened segetal vascular plants of the Łódź Heights comprises 59 species (Table 1). They constitute 18.2% of all taxa (325 species) of the segetal flora of this mesoregion. The following numbers of species belong to the given threat categories: CR – critically endangered species (1), EN – endangered species (13), VU – vulnerable species (31), LC – lower risk species (8), DD – data deficient species (6).

Numerous plants included in this list are species of narrow specialization, very narrow ecological amplitude and specific habitat requirements. Many of them are represented by infrequent populations. There are among them, beside others, specialized weeds of flax (*Lolium remotum*, *Spergula arvensis* subsp. *maxima*) and weeds of cereals (e.g. *Avena strigosa*, *Bromus arvensis*, *Bromus secalinus*), which diaspores are adapted to speirochoric widespreading with the sowing material.

*Anagallis foemina*, *Centunculus minimus*, *Coronopus squamatus*, *Euphorbia exigua*, *Fumaria vaillantii*,

*Illecebrum verticillatum*, *Misopates orontium*, should be mentioned, among others, as species of a very narrow ecological amplitude and specific habitat requirements. One of rare taxa is covered by protection there. This species is *Ornithogalum umbellatum* (Olaczek 1992).

The impoverishment of the segetal flora of the Łódź Heights is an effect of numerous causes. The most serious changes in this flora, expressed, among others, in a decrease in the number and biomass of sites, result, first of all, from the changes in abiotic environmental conditions and transformations of agrophytocoenoses.

### 4. Conclusions

The phenomenon of recession in such an abundant group of segetal vascular plants leads to a decrease in the diversity of the segetal flora of the Łódź Heights. Due to the extinction and recession of these species not only changes in the qualitative and quantitative character of the investigated flora take place, but also the impoverishment of field weed communities occurs. Some typical stands of phytocoenoses disappear and the area occupied by these phytocoenoses considerably decreases. Fragmentary communities appear instead of them in such places. This occurs because the most specific elements are eliminated from the former ones. It also leads to the vanishing of specialized communities, typical of, among others, given soils, or plant cultures.

Hence, the problem of protecting the endangered species of the segetal flora of the Łódź Heights must be paid attention to. Besides the tendency to conserve the analysed species within their specific ecosystems, an attempt at cultivating critically endangered and vulnerable species in artificial conditions, e.g. in agioreserves, skansen museums, agricultural museums, experimental and scientific research stations, botanic gardens, zones of protected landscape, landscape parks, should be taken into consideration. Also, other methods of protection, such as seed banks, should be applied.

### References

- ANDRZEJEWSKI H. & KUROWSKI J. K. 2002. Park Krajobrazowy Wzniesień Łódzkich. In: J. K. KUROWSKI (ed.). Parki Krajobrazowe Polski Środkowej, pp. 110-125. Wyd. Uniw. Łódź., Łódź.
- CZYŻEWSKA K. 1998. Kategorie czerwonej listy. In: K. CZYŻEWSKA (ed.). Różnorodność biologiczna porostów, pp. 29-44. Wyd. Uniw. Łódź., Łódź.
- GŁOWACIŃSKI Z. 1997. Nowe kategorie IUCN/WCU dla gatunków zagrożonych i ginących. Chrońmy Przyr. Ojcz. 53(1): 60-66.
- IUCN 1994. Red List Categories. Prepared by the IUCN Species Survival Commission. As approved by the 40th Meeting of the IUCN Council. Gland, Switzerland.
- KAŹMIERCZAKOWA R. & ZARZYCKI K. (eds.). 2001. Polska czerwona księga roślin. Paprotniki i rośliny kwiatowe, wyd. 2, 664 pp. PAN, Instytut Botaniki im. W. Szafera, Instytut Ochrony Przyrody, Kraków.
- KONDRACKI J. 1977. Regiony fizjograficzne Polski. 178 pp. Wyd. Uniw. Warszaw., Warszawa.
- MIREK Z., PIĘKOŚ-MIRKOWA H., ZAJĄC A. & ZAJĄC 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.
- OLACZEK R. 1992. Rośliny chronione w Polsce. 12 pp. LOP, Warszawa.

- SZAFER W. 1972. Szata roślinna Polski niżowej. In: W. SZAFER & K. ZARZYCKI (eds.). Szata roślinna Polski, II, wyd. 2, pp. 17-188. PWN, Warszawa.
- SZAFER W. & PAWŁOWSKI B. 1972. Geobotaniczny podział Polski. Mapa. In: W. SZAFER & K. ZARZYCKI (eds.). Szata roślinna Polski, II, wyd. 2. PWN, Warszawa.
- ZARZYCKI K. & SZELĄG Z. 1992. Czerwona lista roślin naczyniowych zagrożonych w Polsce. In: K. ZARZYCKI, W. WOJEWODA & Z. HEINRICH (eds.). Lista roślin zagrożonych w Polsce, wyd. 2, pp. 87-98. PAN Instytut Botaniki im. W. Szafera, Kraków.
- WARCHOLIŃSKA A. U. 1986-1987. Lista zagrożonych gatunków roślin segetalnych środkowej Polski. *Fragm. Flor. Geobot.* 31(32): 225-231.
- WARCHOLIŃSKA A. U. 1993. Chwasty polne Wzniesień Łódzkich. *Atlas rozmieszczenia*. 413 pp. Wyd. Uniw. Łódź., Łódź.