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An expansion of *Heracleum mantegazzianum* SOMMER & LEVIER (*Heracleum sosnovskyi* MANDEN.) in Central Poland?

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Abstract: *Heracleum mantegazzianum* is a species of systematic postion undetermined in relation to *H. sosnovskyi* (MIREK et al. 2002; ZAJĄC, ZAJĄC 2001). In Central Poland is an invasive species and has been rarely noted in that area, similarly as in other regions of Polish lowlands (RUTKOWSKI, 1998).
Due to being ornamental and interesting from the floristic point of view, this plant, which is cultivated in orchards, is most frequently unintentionally or intentionally introduced by Man to various habitats. These are parks, bankside areas, ditches, forest edges and meadows, etc. (MOWSZOWICZ 1978, OLACZEK, 1974). It seems that this species, which is expansive in other parts of Poland (Mazuria, Beskid Sądecki) (ZAJĄC, ZAJĄC 2001), will be colonizing new areas in Central Poland.
Consequently, carrying out an inventory study of the new species, till recently alien to our flora, seems necessary.

Keywords: invasive species, *Heracleum mantegazzianum, Heracleum sosnovskyi*, distribution, Central Poland.

Introduction

In the recent dozens of years the flora and plant communities of almost all the world are much transformed by increased human impact on natural

environment. Terrains that are thus transformed possess particularly favorable conditions for the acclimatization of invasive species.

The rich floristic and phytosociological literature records numerous cases of recent invasions in various parts of Europe and North America (MANDENOVA 1950; MANDENOVA 1951; BRUMMITT 1968; SUKOPP 1969; CLEGG & GRACE 1974; MORTON 1978; DIERSCHKE 1984; LUNDSTRÖM 1984; SACYPEROVA 1984; KLAUCK 1988; TURK 1988-1989; GRUDZINSKAS 1989; KORNAŚ 1990; PYŠEK 1991; BALOGH et al.1994; KOLBEK et al. 1994; LUNDSTRÖM & DARBY 1994; PYŠEK & PYŠK 1994; BALÁŽ & TURIS 1995; NOVOHRADSKÝ 1995; PYŠEK & PYŠEK 1995; RUNKOVIČ 1995; TERPÓ 1995; BALOGH 1996; OCHSMANN 1996; TILEY et al. 1996; DANCZA 1997; ELIAŠ 1997; CVACHOVÁ et al 1998; JACOB et al. 1998; JEHLIK 1998; OTTE & FRANKE 1998; PYŠEK et al. 1998; CVACHOVÁ 2000; NEJC 2001; BALOGH et al. 2003; PIETOROVÁ 2003; TÖRÖK et al. 2003).

Also in Poland their appearance and spontaneous widespreading in various plant communities, synanthropic, seminatural and natural is observed (WRÓBEL-STERMIŃSKA 1958; BALCERKIEWICZ 1972; ĆWIKLIŃSKI 1973; ANIOŁ-KWIATKOWSKA 1974; OLACZEK 1974; KUROWSKI 1977; MOWSZOWICZ 1978; LUTYŃSKA 1980; BIAŁECKA 1982; PASIEKA 1984; BOCHNIARZ & BOCHNIARZ 1986; MIREK 1986-1987; MIREK & PIĘKOŚ-MIRKOWA 1987; KOTAŃSKA 1991; JACKOWIAK 1993; KORNIAK & HOŁDYŃSKI 1996; KORNIAK & ŚRODA 1996; STUPNICKA- RODZYNKIEWICZ & KLIMA 1996; TOWPASZ 1996; TRZCIŃSKA-TACIK 1996; WARCHOLIŃSKA 1996; WARCHOLIŃSKA & SICIŃSKI 1996; SZELĄG 1997; HEREŹNIAK, SICIŃSKI 1998; WARPECHOWSKI 2000; ZAJĄC & ZAJĄC 2001; JĘDRZEJKO & WALUSIAK 2004).

This is also the case in central Poland, where abundant invasive species, such as *Acer negundo* L., *Padus serotina* (EHRH.) BORKH., *Quercus rubra* L., *Anthoxanthum aristatum* BOISS. (*Anthoxantum puelii* LECQ. et LAMOTTE), *Bromus carinatus* HOOK & ARN., *Conyza canadensis* (L.) CRONQUIST. (*Erigeron canadensis* L.), *Galinsoga ciliata* (RAF.) S. F. Blace (*Galinsoga quadriradiata* RUIZ & PAV.), *Galinsoga parviflora* CAV., *Echinocystis lobata* (F. MICHX.) TORR.& A. GRAY, *Erigeron annuus* (L.) PERS., *Impatiens parviflora* DC., *Impatiens glandulifera* ROYLE (*Impatiens roylei* WALP.), *Reynoutria japonica* HOUTT. (*Polygonum cuspidatum* SIEBOLD & ZUCC.), *Reynoutria sachalinensis* (F. SCHMIDT) Nakai (*Polygonum sachalinense* F. SCHMIDT), *Rudbeckia laciniata* L., *Solidago canadensis* L., *Solidago gigantea* AITON (*Solidago serotina* Aiton), *Vicia grandiflora* SCOP. for example, acclimatized themselves in not distant past.

Another invasive taxon of a small number of so far detected sites is *Heracleum mantegazzianum* SOMMER & LEVIER. Its systematic position in relation to *Heracleum sosnovskyi* MANDEN. (ZAJĄC & ZAJĄC 2001; MIREK et al. 2002;) is so far unexplained. Due to this they will be considered together in the present study.

Materials and methods

The aim of the undertaken research was developing an inventory of present sites of the invader from the Caucasus in Poland. For this end scientific

publications (OLACZEK 1974, MOWSZOWICZ 1978), herbal collections of the University of Łódź Herbarium (Herbarium Universitatis Lodziensis – LOD) (MIREK et al.1997) and data from Łódź botanists were used. Also, floristic and phytosociological observations and research in the fields were carried on.

Results

Presumably, *Heracleum mantegazzianum* SOMMER & LEVIER and *Heracleum sosnovskyi* MANDEN., originating from the Caucasus, due to the body size of their specimens, and specific and attractive appearance were frequently cultivated, as floristic peculiarities, in home gardens and parks (WRÓBEL-STERMIŃSKA 1958; OLACZEK 1974; MOWSZOWICZ 1978; OTTE & FRANKE 1998;).

OLACZEK (1974) reported the occurrence of its abundant population in a manor house garden at the Łęki Kościelne Village close to Kutno Town, as early as before World War II. In the old park about 100 specimens of the plant bloomed in 1970. Due to intensive destructing (various methods) and natural regeneration of forest in that area no specimen of the species was detected on this site in 2004. Perhaps, its diaspores that have survived in soil will make it appear again.

In the University of Łódź Herbarium (Herbarium Universitatis Lodziensis – LOD) (MIREK et al. 1997) there is a herbal plate from Mr Werner's garden in Łodź, of 19 July 1947, lg. J. MOWSZOWICZ).

After 1950, taking into account forage value of the Caucasian hogweed its observations and investigations were started and it was cultivated on a larger scale in numerous experimental-research centers in various parts of Poland.

At present, despite its cultivation having been abandoned, it has grown wild and as such continues to exist in the areas of its former plantations, also invading adjoining terrains (KORNIAK & ŚRODA 1996; STUPNICKA - RODZYNKIEWICZ & KLIMA 1996).

In summer 1971 the author of the present study observed its specimens growing in a school garden of the agricultural college at the Sędziejowice Village close to the Łask town.

KUROWSKI (1977) noted the occurrence of several specimens of the plant growing at the road bridge across the Warta River at the Burzenin Village close to the Sieradz Town.

Poor sites of the species, represented by solitary specimens, were observed at a heat and power plant in the Częstochowa Town, close to the Warta River (HEREŹNIAK, SICIŃSKI 1998) and in Fabryczna Str. in Łódź, on a street side at allotment gardens (personal observation, 2000).

At present, the richest site of this species in Central Poland is that at Lućmierz Village, to the north of the Zgierz Town. It is located close to the Experimental Station for Race Evaluation, in which the hogweed was cultivated since 1958. In the fields of the former plantation it does not occur any more, whereas it has widespread in three areas: in an adjoining ditch, at the station's buildings with technical equipment, and in a forest-side meadow.

The specimens of this anthropophyte growing in the ditch and at the buildings are now being destroyed in various ways: by mowing out, pouring over with petrol, with herbicides and their combinations, in various concentrations (Roundup, Reglone, Dual, Chwastox).

Only infrequent specimens of the plant manage to bloom and fruit, because most of them are usually destroyed when first leaves appear.

In this site about 75 specimens of the plant grow, but only 6 at the buildings; they are affected by various anthropopressure methods.

An opposite situation is observed in the forest-side meadow, where about 80 specimens bloomed and fruited in 2004, while part of them reached almost 4 meters in height and a stem circumference of 25-30 cm at the base.

The body size of the plant, its exceptional appearance and high number of specimens in its populations, particularly at the time of blooming and fruiting, much impress their spectators.

A phytosociological relevé (Localite: Lućmierz near Zgierz; Date: 15 VII 2004; Area of sample plot: 200 m^2; Number of species in relevé: 18 ; Plants: *Heracleum mantegazzianum* (*H. sosnovskyi*) 5.5, Differential species: *Alopecurus pratensis* 1.1, *Glechometalia hederaceae*: *Anthriscus sylvestris* 1.1, *Glechoma hederacea* 1.1, *Heracleum sphondylium* 1.1, *Lamium album* +, *Galio-Urticenea: Galium aparine* 2.2, *Artemisietea vulgaris*: *Urtica dioica* 3.3, *Artemisia vulgaris* 1.1, Characteristic companion: *Cirsium arvense* 2.2, Companions: *Agropyron repens* 2.2, *Ranunculus repens* 2.2, *Agrostis vulgaris* 1.1, *Arctium tomentosum* 1.1, *Geum urbanum* 1.1, *Rumex obtusifolius* 1.1, *Stellaria nemorum* 1.1, *Impatiens parviflora* +) made in this stand with the Braun-Blanquet method (PAWŁOWSKI 1972) may be included to the previously distinguished communities of: *Urtico-Heracleetum mantegazzianii* (KLAUCK 1988) and *Heracleum mantegazzianum- Galio-Urticenea* community (OTTE & FRANKE 1998).

By abundantly occurring there, and shading/canopying other, smaller plants with especially large leaves, it alters the simplifies the floristic composition and structure that occurs there. The presence of its large specimens is a factor contributing to a degeneration of the community.

Summary

The diagnostic features of *Heracleum mantegazzianum* SOMMER & LEVIER are little precise and do not allow us to distinguish it with much certainty from the close species of *Heracleum sosnovskyi* MANDEN.

Being cultivated for ornamental and decorative as well as forage purposes (Łęki Kościelne, Łódź, Sędziejowice, Lućmierz) it started to penetrate adjoining communities, which it later colonized. It mostly penetrated seminatural and ruderal communities, such as: meadows, ditches, building neighbourhoods (Lućmierz, Częstochowa, Łódź), river banks (Burzenin) and manor parks (Łęki Kościelne). It mostly occupies habitats with relatively fertile and humid soil. In such areas its development is optimal.

From the so far carried out research it follows that this species of foreign origin (anthropophyte, anthropophyta), and more precisely a newcomer (kenophyte, kenophyta=neophyta), possesses infrequent occurrence sites in central Poland, similarly as in whole Poland (RUTKOWSKI 1998), except the Beskid Mts. and the Masurian Lakeland (KORNIAK & ŚRODA 1996; STUPNICKA-RODZYNKIEWICZ & KLIMA 1996).

In general, they are dispersed sites (Fig. 1), composed of solitary (Częstochowa, Łódź) or few specimens (Burzenin), and much threatened. Only its relatively large population at Lućmierz seems to be able to survive, and even to increase its occurrence area.

Beside natural methods of self-distribution of seeds (anemochoria, hydrochoria, zoochoria) Man plays an exceptional role in its widespreading in this part of Poland (conscious seeding, accidental seeding). However, it is also Man who is responsible for the extinction of its large population in the manor park at Łęki Kościelne, while it might be presumed that specimens of such an epekophyte are difficult to exterminate (to destroy).

The considerable invasiveness, strong competitiveness, strong vitality, and exceptional body size of this plant are factors causing degeneration of communities in which it occurs. A high number of specimens negatively affects local flora, vegetation (i.e. plant communities) and plant cover.

The expansiveness and vitality of the subalpine (piedmont) invader from Caucasian mountains indicates that it an acclimatized anthropophyte in the flora of central Poland and exhibits a tendency to further spreading.

Up to date observations and investigations indicate that its specimens do not encounter best conditions, mostly edaphic but also climatic, to develop in this part of the country.

Consequently, making an inventory of new sites, pursuing the dynamism and expansion rate of this peculiar but dangerous for our native flora plant seems worthwhile.

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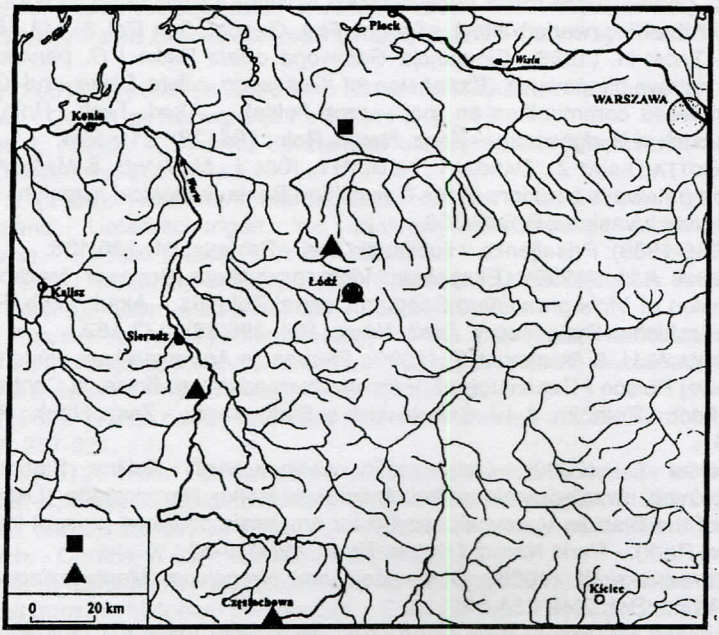

Fig.1. Distribution of *Heracleum mantegazzianum* SOMMER& LEVIER (*H. sosnovskyi* MANDEN.) in Central Poland (state in 2004).
quadrant – localities known
triangle – localities unknown