

Heracleum sosnowskyi Manden

Oliwia Jakubowicz¹, Czesław Żaba², Gerard Nowak³, Stanisław Jarmuda¹, Ryszard Żaba¹, Jerzy T. Marcinkowski⁴

¹ Department of Dermatology, Poznan University of Medical Sciences, Poznan, Poland

² Chair and Department of Forensic Medicine, Poznan University of Medical Sciences, Poznan, Poland

³ Chair and Department of Medicinal and Cosmetic Natural Products, Poznan University of Medical Sciences, Poznan, Poland

⁴ Chair of Social Medicine, Poznan University of Medical Sciences, Poznan, Poland

Jakubowicz O, Żaba C, Nowak G, Jarmuda S, Żaba R, Marcinkowski JT. *Heracleum sosnowskyi* Manden. Ann Agric Environ Med. 2012; 19(2): 327-328.

Abstract

Heracleum Sosnowskyi was discovered in 1772 and described as a separate species in 1944 by I. P. Mandenova. Its name is derived from the surname of a botanist studying Caucasian flora, Prof. D.I. Sosnowski. In the area of the Caucasus foothills, the plant reaches approximately 1-1,5 m in height, whereas in Poland its size is significantly larger, up to 3-3.5 m. *Heracleum* blooms from mid-June to the end of July. The flowers are arranged in umbels and last for 2-3 weeks. In Central Europe, the species colonizes mostly neglected green areas, ruins and riversides. *Heracleum* poses a serious threat to the human population due to its photoallergic properties, resulting from the presence of intensely toxic furanocoumarin in its sap. Furanocoumarins are found in small hairs that cover the leaves and stem, and are the components of the essential oil. They may penetrate the skin through the epithelial layer, posing a direct threat to human health. Contact with the plant, followed by sun exposure, may lead to the development of large blisters and symptoms of burns. *Heracleum*, in the event of consumption, is also harmful to farm animals, causing, among others, internal bleeding and diarrhea. Although the toxic properties of *Heracleum* have been known for many years, every summer people who had contact with the plant present at physicians of different medical specialties.

Key words

Heracleum Sosnowskyi, green areas, riversides, furanocoumarins, photoallergic properties

Heracleum Sosnowskyi (*Heracleum*) was discovered in 1772, and described in 1944 by I.P.Mandenova as a separate species. Its name is derived from the surname of Prof. D. I. Sosnowskyi, a botanist studying Caucasian flora. Natural habitats of *Heracleum* are found in the undergrowth near mountain brooks in western and eastern Transcaucasia and Dagestan. In Central Europe, the species colonizes mostly neglected green areas, ruins and riversides [1, 2, 3]. The Latin name *Heracleum* is derived from Antiquity, from the discoverer of *Heracleum* – Heracles [4]. In Europe, there are two other species of *Heracleum*, *Heracleum sphondylium*, and *Heracleum mantegazzianum*. All of them contain furanocoumarins with photoallergic properties in the aerial parts. The most dangerous among them are psoralen, bergapten, isopimpinellin and xanthotoxin (Fig. 1) [5]. Active centres of these compounds are presented in Figure 2 [6].

Heracleum is a herbaceous plant, annual or biennial, that bears fruit only once and dies after setting seeds. It belongs to the umbelliferous (apiaceae) family of plants. In the area of the Caucasus foothills the plant reaches approximately 1-1.5 m in height, whereas in Poland its size is significantly larger, up to 3-3.5 m. It has thickly ridged, hollow stem, up to 12 cm in diameter. The leaves are palmate and reach up to 2 m in length. Small, white or pink flowers form large umbels (Fig. 3). The tap root of *Heracleum* reaches deep and is able to absorb numerous valuable compounds from the deeper layers of the soil and substratum [1, 2, 3, 7, 8, 9, 10].

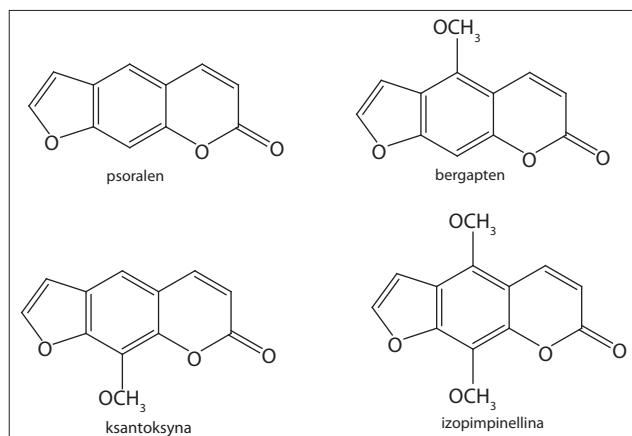


Figure 1. Structures of some furanocoumarins found in *Heracleum* species

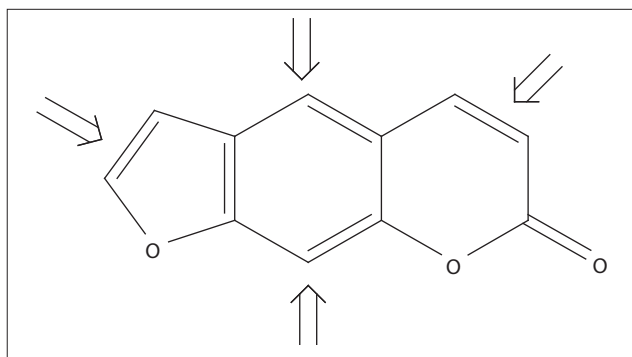


Figure 2. Active centers of furanocoumarins

Address for correspondence: Jerzy T. Marcinkowski Chair of Social Medicine, Poznan University of Medical Sciences, 5C Rokietnicka, 60-806 Poznan, Poland.
E-mail: jtmarcin@gmail.com

Received: 14 April 2012; accepted: 25 May 2012



Figure 3. *Heracleum Sosnowskyi*

The photoallergic properties of *Heracleum* are connected with the presence of furanocoumarins in its sap. They are also found in the small hairs that cover the leaves and the stem, and are the components of the essential oil. They may penetrate the skin through the epithelial layer, posing a direct threat to human health. Contact with the plant, followed by sun exposure, may lead to the development of gigantic blisters and symptoms of burns. The symptoms occur several hours after sun exposure. Erythema and blisters, filled with serous liquid, are observed on the contact area of the skin. The most frequently affected sites are the exposed areas, namely the face, arms and lower limbs. *Heracleum*, in the event of consumption, is also harmful to farm animals, causing, among others, internal bleeding and diarrhea. The burning properties of coumarin intensify during sunny spells, high temperature and high humidity, as well as during the period of blooming and maturing of *Heracleum*. In such conditions, the burns on the skin may occur as a result of being in the vicinity of the plant, without direct contact. Exposure to *Heracleum* may also lead to conjunctivitis. Photoallergic furanocoumarins are also found in *Heracleum mantegazzianum*, which has a more decorative appearance compared to *Heracleum Sosnowskyi* [1, 2, 7, 8, 9, 11].

On the European continent, *Heracleum* blooms from mid-June to the end of July. Flowers are arranged in umbels and last for 2-3 weeks. Maturation of seeds takes place from the end of August until October. A medium-sized plant produces approximately 20,000 seeds, most of which will stay close to the mother plant. However, some - naturally or with the help of man - may spread further and invade new habitats [1, 2, 3].

Heracleum Sosnowskyi was brought to Poland in the 1970s. Due to a large amount of nutrients, especially fats and carbohydrates, and rapid biomass growth, the species was originally intended to be used as a fodder plant. *Heracleum* cultivation was started in selected collectivized farms, mostly in the south of the country. The idea was quickly abandoned

due to difficulties with harvesting, as the considerable size of the plants was an obstacle in mechanical harvesting, and the photoallergic properties prevented manual harvesting. Unfortunately, the attempts to stop its expansion, which limited the occurrence of local habitats of weaker species, proved futile. Currently, *Heracleum* is found mostly in the southeastern and northeastern regions of Poland, but the species is present in the entire country. *Heracleum mantegazzianum*, on the other hand, originally introduced to Poland for decorative purposes, grows in the southwestern part of the country [1, 3, 8, 9, 12, 13].

Although the photoallergic properties of *Heracleum* have been known for years, every summer people who had contact with the plant present at physicians of different medical specialties. In July 2011, a patient was admitted to the Dermatology Clinic in Poznań after a trip to Corsica, where he had contact with *Heracleum* while visiting the National Park. Large blisters and erythema were found in the area of the arms and shins. Four more participants of the same trip were hospitalized in other hospitals in Poznań. It is important to bear in mind that *Heracleum Sosnowskyi* belongs to a group of toxic plants, dangerous both to humans and animals, and sun exposure must be avoided after the contact with this plant.

REFERENCES

1. Śliwiński M. Inwazyjne gatunki roślin ekosystemów mokradłowych Polski. Dajdok Z., Pawlacyk P. (Ed.). Wydawnictwo Klubu Przyrodników. Świebodzin, 2009; 54-57.
2. Wojtkowiak R, Kawalec H, Dubowski AP. *Heracleum Sosnowskyi* Mandel L. J Res Appl Agric Eng. 2008; 53(4): 137-142.
3. Miklaszewska K. Barszcz Sosnowskiego – obcy gatunek inwazyjny: biologia, zagrożenia, zwalczanie. Prog Plant Protection/Post Ochr Roślin 2008; 48(1): 297-300.
4. Strzelecka H, Kowalewski J. Encyklopedia zielarstwa i ziołolecznictwa. Wydawnictwo PWN, Warszawa, 2000.
5. Dewick PM. Medicinal Natural Products. John Wiley & Sons. New York Weinheim, 1998.
6. Hausen BM, Vieluf IK. Allergiepflanzen Pflanzenallergene. Ecomed, Landsberg/München, 1997.
7. Wróbel I. Barszcz Sosnowskiego (*Heracleum sosnowskyi* MANDEN.) w Pieninach. Pieniny – Przyroda i Człowiek. 2008; 10: 37-43.
8. Jędrzejko K, Walusiak E. Fotouczulające rośliny obcego pochodzenia i ich biologiczne właściwości – na przykładzie kaukaskich barszczy Sosnowskiego i Mantegazziego (*Heracleum sosnowskyi* i *Heracleum mantegazzianum*). Panacea Lek Zioł. 2004; (4): 35-36.
9. Sadowska A. Rakotwórcze i trujące substancje roślinne. Wydawnictwo SGGW, Warszawa, 2004.
10. Falkowski M. Łąkarstwo. Państwowe Wydawnictwo Rolnicze i Leśne. Vol.1. Warszawa, 1965.
11. Burgdorf WHC, Plewig G, Wolff HH, Landthaler M. Braun-Falco Dermatologia. Vol.2. Wydawnictwo Czelej, Lublin, 2010.
12. Wrzesińska D. Szkodliwe pluskwiaki (Hemiptera) zasiedlające barszcz Sosnowskiego (*Heracleum sosnowskyi* Manden). Prog Plant Protection/Post Ochr Roślin. 2007; 47(4): 259-261.
13. Zając A, Zając M. Atlas rozmieszczenia roślin naczyniowych w Polsce. Pracownia Chorologii Komputerowej Instytutu Botaniki Uniwersytetu Jagiellońskiego. Kraków, 2001.