



New localities of *Heracleum mantegazzianum* Sommier et Levier (Apiaceae) in Croatia and control measures taken

IGOR BORŠIĆ¹
LJILJANA BOROVEČKI-VOSKA²
PETRA KUTLEŠA¹
PETRA ŠEMNIČKI³

¹ State Institute for Nature Protection,
Radnička cesta 80/7, Zagreb, Croatia

² Radoboj 27, Radoboj, Croatia

³ Public Institution for Management of Protected
Natural Values of Krapina-Zagorje County,
Magistratska 1, Krapina, Croatia

Corresponding author:

Igor Boršić
State Institute for Nature Protection,
Radnička cesta 80/7, 10000 Zagreb, Croatia
E-mail: igor.borsic@dzzp.hr

Key words: giant hogweed, invasive alien species,
mechanical control, prevention of spread

Abstract

Background and Purpose: The species *Heracleum mantegazzianum* (Apiaceae) originates from the Western Greater Caucasus (Russia, Georgia), but today it is widely distributed in Europe due to deliberate introductions as ornamental plant and subsequent spontaneous spread. Therefore it is considered to be an invasive alien species. Its main negative impact concerns human health, as it produces phototoxic sap which causes skin burnings when exposed to UV light. In Croatia it was first recorded in 2009 near Žabnik (Međimurje County), but afterwards it has not been found on this locality again.

Materials and Methods: Floristic research in the Zagorje area was carried out during July and August 2014, using GPS Receiver to determine investigated localities.

Results: The species *Heracleum mantegazzianum* was recorded on 16th July 2014 in Gornja Šemnica (Radoboj, Krapina-Zagorje County), on two localities approximately 300 m apart. The localities were revisited on 1st August 2014. To control the spread of the species manual elimination of fructifying umbels was applied. On both localities floristic composition and general vegetation type were determined.

Conclusion: Monitoring of recorded sites and adjacent areas, control measures, and possible eradication of all individuals of *Heracleum mantegazzianum* should be conducted in the following years in order to control and possibly eradicate this invasive alien species.

INTRODUCTION

The species *Heracleum mantegazzianum* Sommier et Levier (Apiaceae) originates from the Western Greater Caucasus (Russia, Georgia), but today it is widely distributed in Europe. History of its spread dates back to the beginning of 19th century, when it was introduced to the Kew Botanic Gardens (London) and subsequently formed its first naturalized population in Cambridgeshire (1). Today, due to deliberate introductions as ornamental plant and subsequent spontaneous spread, it is distributed in numerous western, northern and central European countries and is considered to be an invasive alien species (2, 3). It was shown that its dispersal on regional and continental level is human-mediated, while locally the species spread depends on its biological traits (4). While disturbed habitats are more easily invaded, it also invades semi-natural vegetation (5). Although it has different negative effects on the invaded

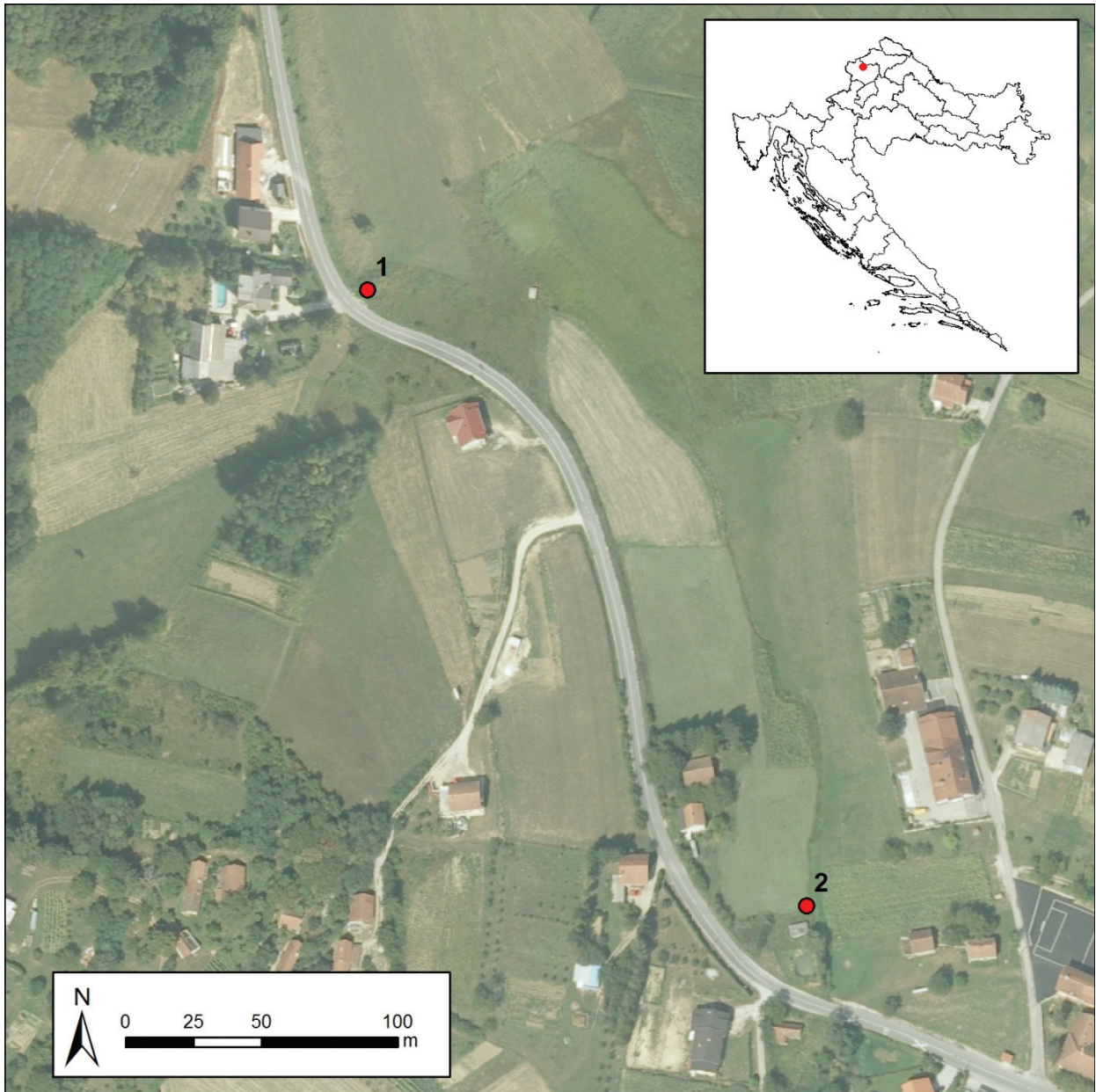


Figure 1. Geographic position of new localities of *Heracleum mantegazzianum* in Croatia.

habitats, such as outcompeting and replacing native vegetation, its main negative impact concerns human health, as it produces phototoxic sap which causes skin burnings when exposed to UV light (3).

The species is monocarpic perennial which can grow up to 5 m tall. Its ridged stem has purple blotches and pustulate bristles. Leaves are alternate, ternately or pinnately lobed and coarsely toothed. The inflorescences are compound umbels: there is one terminal and up to eight satellite umbels. Flowers are white or rarely pinkish, also outer radiate. Fruits are flattened and elliptical, narrowly winged, splitting into two mericarps, which have 3-5 elongated oil canals each (2, 6). One plant produces large

number of seeds, establishing short-term persistent soil seed-bank (7). Furthermore, they are efficiently dispersed by water, wind and human-related factors (8).

In Croatia the species was first recorded in 2009 near Žabnik (Međimurje County; 9), but it has not been found on that locality afterwards. Regarding its presence in neighbouring countries, in Slovenia it was noted in Ljubljana and Maribor where it has spread from botanical gardens (10). In Bosnia and Herzegovina it was found in 2010 near Sarajevo, although it must have been present there since 2007 (11). In Hungary it was an ornamental plant but it escaped from many gardens and now it is considered potentially invasive (12).

MATERIAL AND METHODS

Floristic research in the Zagorje area was carried out during July and August 2014. Positions of the investigated localities were determined using Garmin GPSMAP 60CSx GPS Receiver. Species were determined using standard determination keys and iconographies (e.g. 13, 14). The nomenclature of the species follows Flora Croatica database (15). A distribution map was prepared using ESRI GIS ArcMap 10.1 software.

RESULTS AND DISCUSSION

The species *Heracleum mantegazzianum* was first recorded on 16th July 2014 in Gornja Šemnica (Radoboj, Krapina-Zagorje County), on two localities approximately 300 m apart. The localities were revisited on 1st August 2014. Croatian official map projection HTRS96/TM coordinates of the first locality are 456588 and 5113333, while the coordinates of the second locality are 456757 and 5113097 (Fig. 1). WGS84 projection coordinates of the same localities are 46° 9' 30.1824" N, 15° 56' 16.5012" E and 46° 9' 22.5792" N, 15° 56' 24.4572" E, respectively.

On the first locality the species was growing by the road, in the ruderal vegetation of the order *Onopordetalia acanthii* Br.-Bl. et R. Tx. ex Klika et Hadač 1944 (National Habitat Classification: I.1.4. Ruderal communities of continental region) mixed with ruderal vegetation of the class *Galio-Urticetea* Passarge ex Kopecký 1969 (National Habitat Classification I.1.5. Nitrophilous, shady ruderal vegetation; 16) with species: *Achillea millefolium*, *Agrimonia eupatoria*, *Ajuga reptans*, *Arrhenatherum elatius*, *Artemisia vulgaris*, *Calystegia sepium*, *Campanula trachelium*, *Centaurea jacea*, *Chenopodium album*, *Cichorium intybus*, *Cirsium arvense*, *Cirsium vulgare*, *Clematis vitalba*, *Convolvulus arvensis*, *Cornus sanguinea*, *Dactylis glomerata*, *Daucus carota*, *Dipsacus fullonum*, *Equisetum telmateia*, *Erigeron annuus*, *Eupatorium cannabinum*, *Festuca pratensis*, *Galeopsis speciosa*, *Galium mollugo*, *Geranium columbinum*, *Holcus lanatus*, *Hypericum perforatum*, *Lactuca serriola*, *Lamium maculatum*, *Lolium multiflorum*, *Mentha longifolia*, *Mentha pulegium*, *Pastinaca sativa*, *Picris hieracioides*, *Plantago lanceolata*, *Plantago major*, *Polygonum aviculare*, *Potentilla reptans*, *Pulicaria dysenterica*, *Rumex acetosa*, *Rumex crispus*, *Silene latifolia* ssp. *alba*, *Sinapis arvensis*, *Solidago gigantea*, *Sonchus* sp., *Stachys palustris*, *Symphytum officinale*, *Tanacetum vulgare*, *Taraxacum officinale*, *Torilis japonica*, *Urtica dioica*, *Valeriana officinalis*, *Verbena officinalis*, *Vicia cracca*. On this locality, on the area of cca 200 m², 10 fructifying individuals and cca 30 young individuals of *Heracleum mantegazzianum* were counted. The landowner informed us that the site is mowed at least once a year, although the narrow part of the land by the road is more regularly maintained by mowing through the maintenance of public roads. This would explain the fact that in the exact vicinity of the road no fructifying plants were found and

the fact that the plants on the remaining part of the site grew up to 3 m.

On the second locality (see Fig. 1) the species was present in hygrophilous herbaceous vegetation of the alliance *Calthion* R. Tx. 1936 (National Habitat Classification C.2.2.3. Hygrophilous herbaceous vegetation; 16) with species: *Agrimonia eupatoria*, *Agrostis stolonifera*, *Ajuga reptans*, *Arrhenatherum elatius*, *Calystegia sepium*, *Carex birta*, *Carex otrubae*, *Cerastium* sp., *Cirsium oleraceum*, *Coronilla varia*, *Dactylis glomerata*, *Dipsacus fullonum*, *Elymus repens*, *Equisetum palustre*, *Equisetum telmateia*, *Eupatorium cannabinum*, *Galium mollugo*, *Geranium columbinum*, *Holcus lanatus*, *Juncus articulatus*, *Juncus inflexus*, *Lathyrus pratensis*, *Linaria vulgaris*, *Lysimachia nummularia*, *Lythrum salicaria*, *Potentilla reptans*, *Pulicaria dysenterica*, *Ranunculus acris*, *Rubus caesius*, *Scirpus sylvaticus*, *Senecio erraticus* ssp. *barbareifolius*, *Stachys palustris*, *Urtica dioica*, *Vicia cracca*. Invaded area in this locality was smaller than the first one, encompassing cca 10 m², with six fructifying individuals and just few young individuals. Height of the fructifying plants (up to 2 m) on this site would suggest that it is also maintained by regular mowing.

Taking into consideration that an individual plant needs three to five years to flower, population on these sites must have been present here at least since 2011. On the Street View of Google Earth application of the first locality, which was taken in September 2011, young leaf rosettes can be observed, confirming the presence of the species.

The exact introduction pathway of the species is not known, but we presume that unintentional introduction occurred, since to our knowledge the species is not used as ornamental plant in Croatia, nor it would be legally allowed to import or introduce it.

During the second field visit of the localities (i.e. in August) control measures were taken in order to disable the dispersal of seeds and the consequent spread of the species. As the species produces exceptionally high number of seeds (7), control measures in both localities included manual elimination of all fructifying umbels and their safe disposal. Fructifying umbels were put in trash bags, which were then sealed tightly and stored for several months before they were disposed in the garbage.

In addition to monitoring of recorded sites and adjacent areas, control measures, including possible eradication of all individuals, should be conducted during the following years. Furthermore, in the next few years more detailed vegetation study is planned.

Acknowledgement: This work was partly financed within the framework of the project „Development of measures for prevention, early detection and rapid response in case of alien species introduction to natural habitats“.

REFERENCES

1. JAHODOVÁ S, FRÖBERG L, PYŠEK P, GELTMAN D, TRYBUSH S, KARP A 2007 Taxonomy, identification, genetic relationships and distribution of large *Heracleum* species in Europe. In: Ecology and management of giant hogweed (*Heracleum mantegazzianum*) Pyšek, P, Cock M J W, Nentwig W, Ravn H P (ed) CAB International, Wallingford, 1-19 <http://dx.doi.org/10.1079/9781845932060.0001>
2. European and Mediterranean Plant Protection Organization 2009: EPPO data sheet on Invasive Alien Plants *Heracleum mantegazzianum*, *Heracleum sosnowskyi* and *Heracleum persicum*. EPPO Bulletin 39: 489–499
3. KLINGENSTEIN F 2007 NOBANIS – Invasive Alien Species Fact Sheet – *Heracleum mantegazzianum*. Online Database of the North European and Baltic Network on Invasive Alien Species - NOBANIS (www.nobanis.org). Date of access 17/11/2014
4. PYŠEK P, JAROŠÍK V, MÜLLEROVÁ J, PERGL J, WILD J 2008 Comparing the rate of invasion by *Heracleum mantegazzianum* at continental, regional, and local scales. *Divers Distrib* 14(2): 355-363 <http://dx.doi.org/10.1111/j.1472-4642.2007.00431.x>
5. PYŠEK P, PYŠEK A 1995 Invasion by *Heracleum mantegazzianum* in different habitats in the Czech Republic. *J Veg Sci* 6: 711-718 <http://dx.doi.org/10.2307/3236442>
6. BRUMMITT R K 1968 *Heracleum* L. In: Tutin T G, Heywood V H, Burges N A, Moore D M, Valentine D H, Walters S M, Webb D A (eds) *Flora Europaea*, Vol. 2. Rosaceae to Umbelliferae. Cambridge University Press, Cambridge
7. KRINKE L, MORAVCOVÁ L, PYŠEK P, JAROŠÍK V, PERGL J, PERGLOVÁ I 2005 Seed bank of an invasive alien, *Heracleum mantegazzianum*, and its seasonal dynamics. *Seed Sci Res* 15(3): 239-248 <http://dx.doi.org/10.1079/SSR2005214>
8. PYŠEK P, PRACH K 1993 Plant invasions and the role of riparian habitats – a comparison of four species alien to central Europe. *J Biogeogr* 20: 413-420 <http://dx.doi.org/10.2307/2845589>
9. STUNKOVIĆ H 2009 Field observation of *Heracleum mantegazzianum* Somier & Levier. In *Flora Croatica* database. On-Line (<http://hirc.botanic.hr/fcd>). Department of Botany, Faculty of Science, University of Zagreb. Date of access 17/11/2014
10. FRAJMAN B 2009 Orjaški dežen (*Heracleum mantegazzianum*). In: Jogan N (ed) *Tujerodne vrste: Informativni listi izbranih tujerodnih vrst*. Gradivo Projekta Tuja. Zavod Symbiosis, Grahovo
11. MASLO S 2010 Giant hogweed *Heracleum mantegazzianum* Somier & Levier – a new non-indigenous species in the flora of Bosnia and Herzegovina. *Herbologia* 11(2): 17-24
12. TIBORCZ V, CSISZÁR Á, KORDA M, SCHMIDT D, ŠPORČIĆ D, TELEKI B, ZAGYVAI G, BARTHA D 2012 Distribution of Some Invasive Alien Plant Species in Hungary. In: Neményi M, Heil B, Kovács A J, Facskó F (eds) *International Scientific Conference on Sustainable Development & Ecological Footprint: The Impact of Urbanization, Industrial and Agricultural Technologies*. Sopron, p 1-5
13. DOMAC R 1994 *Small Flora of Croatia* (In Croatian). Školska knjiga, Zagreb
14. ROTHMALER W 1995: *Exkursionsflora von Deutschland*. Gustav Fischer Verlag, Stuttgart
15. NIKOLIĆ T (ed) 2014 *Flora Croatica* database. On-Line (<http://hirc.botanic.hr/fcd>). Department of Botany, Faculty of Science, University of Zagreb. Date of access 17/11/2014
16. ANONYMOUS 2014 Ordinance on habitat types list, habitat map and threatened and rare habitat types (In Croatian). Official Gazette 88/2014.