Distribution of Some Invasive Alien Plant Species in Hungary

TIBORCZ Viktor[a*] – CSISZÁR Ágnes[a] – KORDA Márton[a] – SCHMIDT Dávid[a] – ŠPORČIĆ Dean[a] – TELEKI Balázs[a] –ZAGYVAI Gergely[a] – BARTHA Dénes[a]

[a] Department of Botany and Nature Conservation, University of West Hungary, Sopron, Hungary
* Corresponding author: tibvik@emk.nyme.hu; H-9400 Sopron, Ady E. út 5.

Abstract – Invasive alien species (IAS) are the second most important threat to global biodiversity loss, these species cause considerable problems in environment, nature conservation, economy and human health worldwide. In the case of alien species early detection and rapid response has a great importance. The problem of invasive alien species requires national and international cooperation and actions. For these reasons we have been compiled a publication containing the most important invasive and potentially invasive plant species occurring in Hungary. In this publication the taxonomy, morphology, life cycle, distribution, habitat preference, importance in economy and nature conservation of alien species will have been showed. The current distributions of invasive alien plants were analyzed by the Mapping of the Hungarian Flora Program. We mapped some species has already spread in large areas. It can be assessed from these maps which region(s) are endangered in the close future by these invasive.

Keywords: invasive alien species / distribution map / Hungarian Flora Program

1. INTRODUCTION

Invasive alien species (IAS) are the second most important threat to global biodiversity loss, these species cause considerable problems in environment, nature conservation, economy and human health worldwide. In the case of alien species early detection and rapid response has a great importance. The problem of invasive alien species requires national and international cooperation and actions. It is very important to pay attention to invasive species and keep informed all the organizations such as agriculture, forestry, horticulture. Trade might be affected by adventive species as well the public. There are several databases of invasive alien species worldwide, like GISP, Bugwood network, Daisie, Nobanis; and the rate of publications about invasive species are rising continually. In Hungary we would like to emphasise the two volumes of "Özönnövények" (Invasive alien plants) (MIHÁLY – BOTTA-DUKÁT 2004, BOTTA-DUKÁT – MIHÁLY 2006), in which the most important invasive plant species monographs have been showed. These books contain the current list of Hungarian neophytes, the national and international activities and definitions connecting to invasive alien plant species, adaptive characteristics and strategies of invasive plants. 21 chapters of the above mentioned publications have been translated in English and published with title: "The

* Corresponding author: tibvik@emk.nyme.hu, H-9400, Sopron, Ady E. u. 5.

most important invasive plants in Hungary" (BOTTA-DUKÁT – BALOGH 2008). In this present project we would like to compile a publication which contains the most important invasive and potentially invasive plant species occurring in Hungary. This publication differs from the formers in the higher number of presented invasive plant species, and it is completed with current importance in economy and nature conservation, several photos and current distribution maps of invasive alien plants.

2. MATERIALS AND METHODS

We used the Central European Mapping System (NIKLFELD 1971), based on geographical longitude and latitude degrees, to construct the distribution maps. The species were represented in grid units of five geographical longitude degree minutes and three geographical latitude degree minutes. These quadrants are the basic unit of floristic mapping in Hungary. We represent the absence and presence of the species in the quadrates. These maps do not show the abundance of the plant in a quadrate. The distribution maps were made with the aid of the geoinformatic program Digiterra (v. 3.0). The maps show their distribution at a completion rate of data processing approximately 80%. The processing of data is incomplete in some regions, such as southern part of Kiskunság (in South Hungary between the river Tisza and Danube), and Northern part of Tiszántúl (in North-East Hungary)(*Figure 1.*).

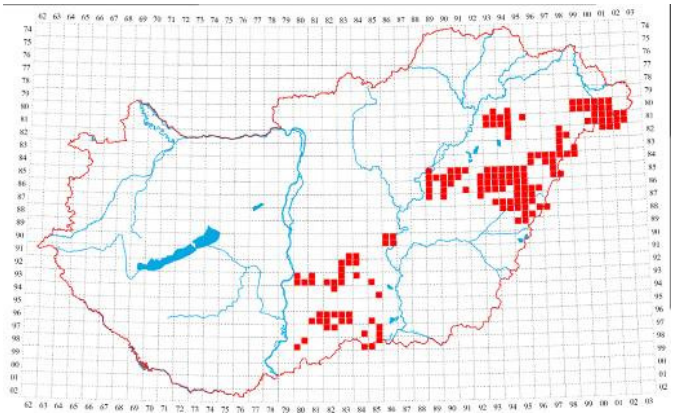

Figure 1. Quadrates which have not been surveyed yet

Flora Mapping data and the authors data were used for the maps. We mapped some species has already spread in large areas. It can be assessed from these maps which region(s) are endangered in the close future by these invasive.

3. RESULTS AND CONCLUSIONS

In the case of list of invasive alien species occurring in our publication we tried to cover as wide range of species as possible, the book contains the most important invasive alien species in nature conservation and agricultural point of view, and a few potentially invasive species which further spread could be predicted in the near future. The book consists of 62 chapters in which 74 species will have been presented, 9 of these are aquatic invaders (*Table 1*).

Table 1. The studied adventive plant species

Abutilon theophrasti Mill.
Acer negundo L.
Ailanthus altissima (Mill.) Swingle
Amaranthus powellii S. Watson
Amaranthus retroflexus L.
Ambrosia artemisiifolia L.
Amorpha fruticosa L.
Asclepias syriaca L.
Aster ×*salignus* Willd.
Aster lanceolatus Willd.
Aster novi-belgii L.
Avena ludoviciana Durieu
Bidens frondosa L.
Buddleja davidii Franchet
Celtis occidentalis L.
Cenchrus incertus M. A. Curtis
Conyza canadensis (L.) Cronquist
Cuscuta campestris Yunck.
Cyperus esculentus L. var. *leptostachyus* Boeck.
Echinocystis lobata (Michx.) Torr. et A. Gray
Elaeagnus angustifolia L.
Eleusine indica (L.) Gaertn.
Erechtites hieracifolia
Erigeron annuus (L.) Pers.
Fallopia ×*bohemica* (Chrtek & Chrtková) J. P. Bailey
Fallopia japonica (Houtt.) Ronse Decr. (var. *japonica*)
Fallopia sachalinensis (F. Schmidt) Ronse Decr.
Fraxinus pennsylvanica Marsh.
Galinsoga parviflora Cav.
Helianthus ×*laetiflorus* Pers.
Helianthus pauciflorus Nutt.
Helianthus tuberosus L. s. l.
Heracleum mantegazzianum Somm. et Lev.
Heracleum sosnowskyi Manden.
Humulus japonicus Siebold et Zucc.
Impatiens glandulifera Royle
Impatiens parviflora DC.
Iva xanthiifolia Nutt.
Juncus tenuis Willd.
Monochoria korsakowii Regel et Maack
Oxalis corniculata L.
Oxalis dillenii Jacq.
Oxalis stricta L.
Padus serotina (Ehrh.) Borkh.
Panicum capillare L.
Panicum ruderale (Kitag.) Lyssov
Parthenocissus inserta (A. Kern.) Fritsch
Phytolacca americana L.
Phytolacca esculenta van Houtte
Potentilla indica (Andrews) Th. Wolf
Rhus typhina L.
Ribes aureum Pursh
Robinia pseudacacia L.
Rudbeckia laciniata L.
Senecio inaequidens DC.
Solidago canadensis L.
Solidago gigantea Aiton
Sorghum halepense (L.) Pers.
Syringa vulgaris L.
Tragus racemosus (L.) All.
Ulmus pumila L.
Vitis vulpina L.
Xanthium albinum Widder H. Scholz subsp. *riparium* (Čelak.) Widder et Wagenitz
Xanthium italicum Moretti
Xanthium saccharatum Wallr.
Azolla filiculoides Lam.
Azolla mexicana C. Presl
Cabomba caroliniana A. Gray
Elodea canadensis Michx.
Elodea nuttallii (Planch.) H. St. John
Hydrocotyle ranunculoides L. f.
Lemna minuta Kunth
Pistia stratiotes L.
Vallisneria spiralis L.

In the subchapter "Taxonomy" the family, subfamily and intraspecific taxonomic categories have been reviewed. The subchapter "Morphology" contains the main morphologic characteristics of plant organs in especial consideration of those which help to identify and distinguish from other similar species. In the subchapter "Life cycle" we reviewed the phenophase of plant species and adaptive strategies which can help the invasive species in establishing and spreading such as efficient regenerative capacity and persistent seed bank type. In the "Distribution" subchapter you can find the origin of species, the natural and synanthrop area and the way of introduction. The subchapter "Hungarian occurrence" contains the current occurrence of taxa as well the short history the establishing and spreading of invasive species. Here we also write about the habitat preferences of the invasive plants. The "Habitat preference" and ecological demands of alien species have been reviewed the next subchapter. The last subchapter "Importance in economy and nature conservation" summarizes the reason of introducing of alien species and their importance in agriculture, forestry or horticulture. The problems in nature conservation and agriculture caused by

invasive alien plants have been presented in this subchapter too with the main control methods.

We would like to represent distribution maps of some important invasive plant in this study. *Robinia pseudoacacia* is a widespread plant in Hungary (*Figure 2*.). It was introduced to Hungary between 1710 and 1720 and planted in the beginning as ornamental tree in parks and alley. It was used firstly for forestation in 1750 close the Komárom around the Fortification of Komárom-Herkály on 290 hectares. The frost sensitivity and the demand for airiness of the soil are the only limiting abiotic factors for the colonization of the black locust. The species can not find the necessary conditions on the sub-mountains areas, at frost recess and where the ground water is to high the floods are frequent or the soils too compacted (BARTHA et al. 2008).

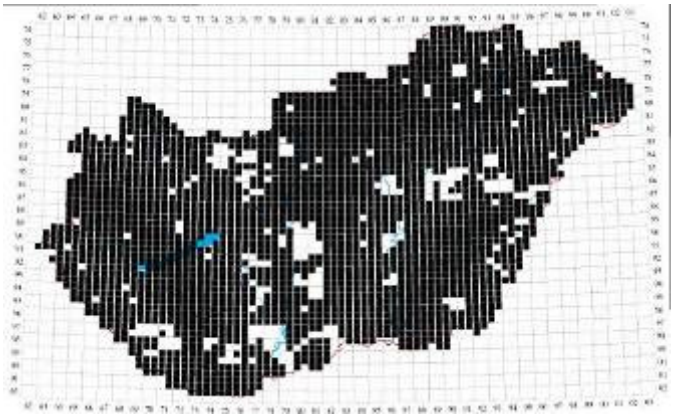

Figure 2. Distribution of Robinia pseudoacacia in Hungary

Fraxinus pennsylvanica is a species which prefers wet condition and its spread in the area of rivers (*Figure 3*). In Hungary around the early 1900s, attempts were made to convert softwood (willow-poplar) gallery forests to hardwood stands, using the green ash. From the 1950s, green ash was used for creating second canopy layer in floodplain poplar plantations. The first report of green ash in scientific literature was in 1950. In Hungary it is common everywhere, except for the western country border region and the mid-altitude hilly (mountains) regions. It is concentrated in river valleys and marshy or saline area (CSISZÁR – BARTHA 2008.)

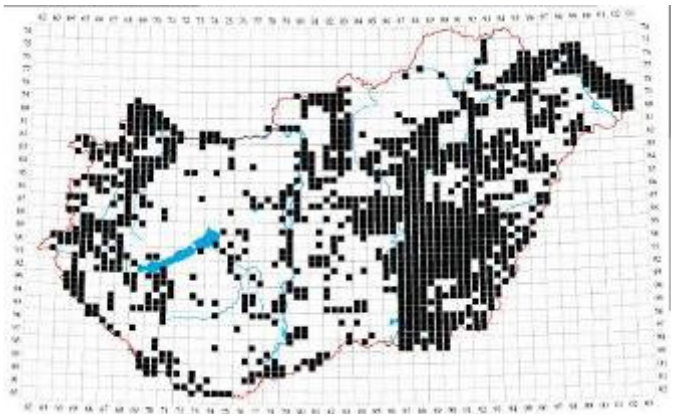

Figure 3. Distribution of Fraxinus pennsylvanica in Hungary

One of the potentially invasive plant is the *Heracleum mantegazzianum* as you can see on the ditribution map (*Figure 4*). It was a cultivated plant in Hungary but right now it escaped from many gardens. This plant has also a dangerous affect, because its shoots contain furanokumarins which cause burning injures on the skin. The first herbarium data was collected in 1880 in garden in Budapest by BORBÁS. Later SOÓ (1980) mentioned that it escaped from gardens in Zirc and near of Szombathely also (DANCZA 2004).

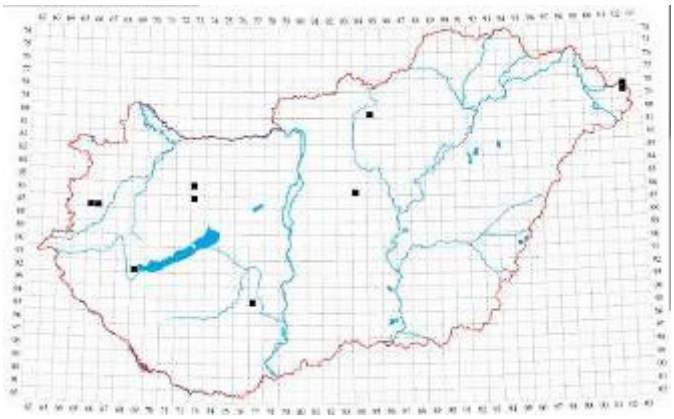

Figure 4. Distribution of Heracleum mantegazzianum in Hungary

It is important to pay attention for the potentially invasive plants because it can spread rapidly and cause serious nature conservation problems.

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