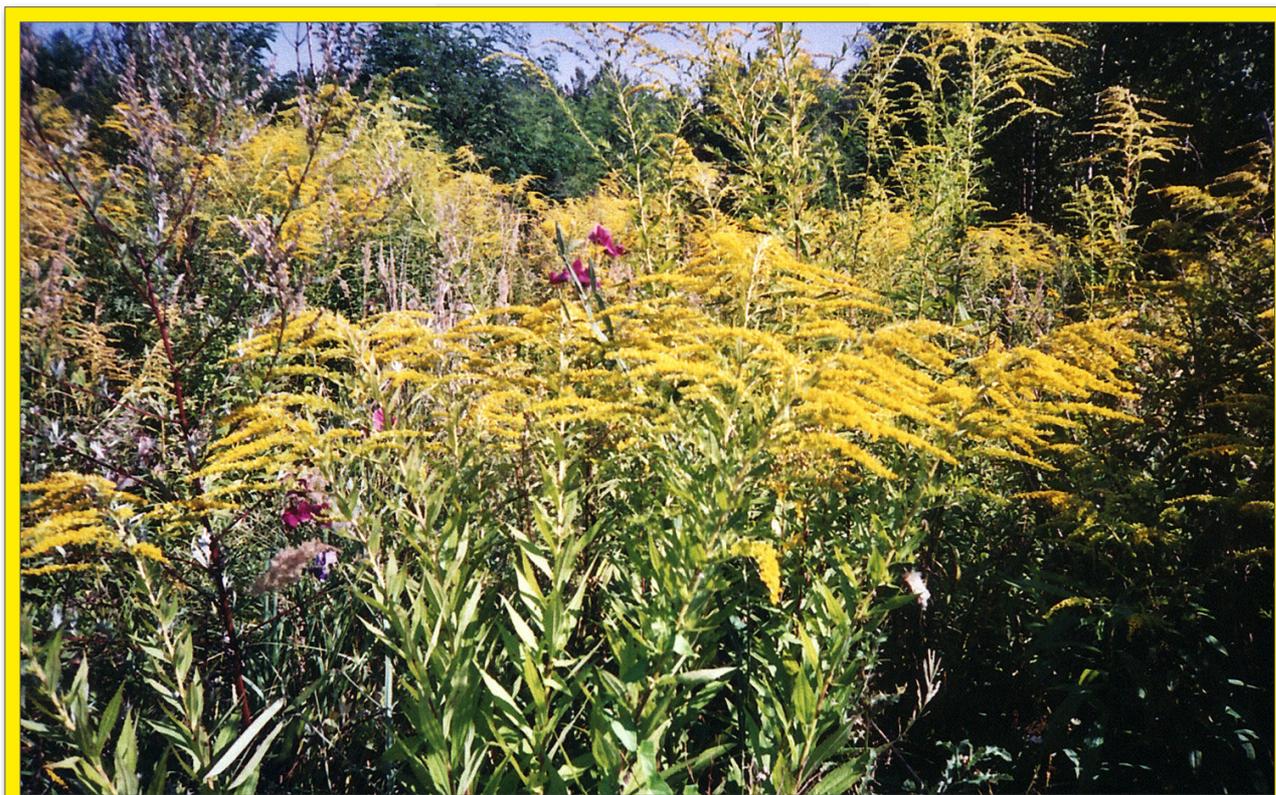


8th International Conference Ecology and Management of Alien Plant Invasions



UNIVERSITY OF SILESIA
Faculty of Biology
and Environmental Protection



Department of Plant Systematics
Department of Geobotany and Environmental Protection



5-12 September 2005
Katowice, Poland

**8th International Conference on the
Ecology and Management of Alien Plant Invasions**

Under the auspices of

His Magnificence, Rector of the University of Silesia - Prof. dr hab. Janusz Janeczek
The Voivode of the Silesian Voivodeship - Lechosław Jarzębski
Regional Polish Television - TVP 3 Katowice

PROCEEDINGS

Department of Plant Systematics
Department of Geobotany and Environmental Protection
Faculty of Biology and Environmental Protection
University of Silesia,

Katowice, Poland, 5 - 12 September 2005

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Editors: Maria Palowska, Barbara Tokarska-Guzik, Gabriela Woźniak
Cover by Marek Francik

CONFERENCE PROGRAMME

**Monday,
5 September**

Pre-conference field sessions
ALIEN INVASIVE PLANT SPECIES VS SPECIFIC TRAITS OF UPPER SILESIA
(a choice between 3 different trips in the region)

08.30 – 10.00 Registration

16.00 – 20.00 Registration (continuation)

10.00 Field trip departures

1. The Jurassic Upland

2. The Upper Silesian Industrial District

3. Odra River Valley and "Cistercian Landscape Compositions of Rudy Wielkie"

19.00 – 20.00 Return to the hotels

**Tuesday,
06, September**

SESSIONS & POSTERS

08.00 – 10.00 -Registration

10.00 – 10.20 -WELCOME ADDRESS AND INTRODUCTION

Morning session: **INVASIVE SPECIES ECOLOGY CASE STUDIES**

Chair of the session: David M. RICHARDSON

S1

10.20 – 11.00 **Invited keynote speaker:** Curtis C. DAEHLER

(University of Hawaii, Honolulu, USA)

Hawaii as a laboratory for plant invasions: shifting scientific and human perspectives over time

11.00 – 11.15 **Eva KÜSTER, Stefan KLOTZ, Ingolf KÜHN**

(UFZ - Centre for Environmental Research, Halle, Germany)

Which traits make an alien invasive ?

11.15 – 11.30 **Cristina MÁGUAS, A. J. PEREIRA, H. EVANGELISTA, C. WERNER, M. RAMOS, O. CORREIA**

(University of Lisbon, Portugal)

Ecophysiological responses of invasive vs native plant species in coastal dune ecosystems (Portugal)

11.30 – 11.45 **Open questions / Discussion**

11.45 – 12.15 **Coffee break**

12.15 – 12.30 **Lenka MORAVCOVÁ, Lukáš KRINKE, Petr PYŠEK, Vojtěch JAROŠÍK, Irena PERGLOVÁ, Jan PERGL**

(Academy of Sciences of the Czech Republic)

Soil seed bank dynamics and seed behavior in *Heracleum mantegazzianum*

12.30 – 12.45 **Jan PERGL, Irena PERGLOVÁ, Petr PYŠEK**

(Academy of Sciences of the Czech Republic)

Life history of a monocarpic invasive species *Heracleum mantegazzianum* in native and secondary distribution areas

12.45 – 13.00 **Zigmuntas GUDŽINSKAS**

(Institute of Botany, Lithuania)

Fecundity of *Lupinus polyphyllus* in relation to habitats and age of individuals

13.00 – 13.15 **Christel ROß, Daniela FAUST, Harald AUGE**

(UFZ - Centre for Environmental Research, Halle, Germany)

No evidence for local adaptation in an invasive plant

13.15 – 13.30 **Discussion**

13.30 – 14.30 **Lunch**

14.30 – 16.00 **Poster session: ALIEN PLANT SPECIES BIOLOGY AND DISTRIBUTION**

Afternoon session: **INVASION PATTERNS**

Chair of the session: Petr PYŠEK

S2

- 16.00 – 16.15 A.J. PEREIRA, M.J. PINTO, H. MARCHANTE, Elizabete MARCHANTE, C. SCHRECK, H. FREITAS, Joao FERREIRA, M.A. MARTINS-LOUÇÃO, O. CORREIA, Cristina MÁGUAS
(University of Lisbon, Portugal)
Two different patterns of *Acacia* spp. invasion in coastal dune ecosystems (Portugal): with and without disturbance
- 16.15 – 16.30 Nicil FUENTES, Eduardo UGARTE, Stefan KLOTZ
(UFZ - Centre for Environmental Research, Halle, Germany)
Reconstructing the spread of invasive species using herbarium data - a case study from Chile
- 16.30 – 16.45 Bruce OSBORNE, Margherita GIORIA
(University College Dublin, Ireland)
Gunnera invasions: a global perspective
- 16.45 – 17.00 Discussion
- 17.00 – 17.30 Tea / Coffee break

Afternoon session: **EUROPEAN INVASIONS IN AUSTRALIA**

Chair of the session: Giuseppe BRUNDU

S3

- 17.30 – 17.45 Emilie-Jane ENS, Kristine FRENCH
(University of Wollongong, Australia)
A crumbling health system: exotic bush affects the fitness and health of Australian coastal flora
- 17.45 – 18.00 Paul O. DOWNEY
(Department of Environment and Conservation, Australia)
The importance of long-term studies in the management and ecology of alien plants - Scotch broom (*Cytisus scoparius*) 19 years on
- 18.00 – 18.15 Andy SHEPPARD
(CSIRO Entomology, France)
Invasive alien plant species of European origin in Australia: their importance, evolution and management history

18.30 – 19.30



WORKSHOP 1

Plant species originating from Europe as invasive aliens in
Australia: taxonomy and determination

Moderators: Andy SHEPPARD & Giuseppe BRUNDU

20.00 – 24.00 Conference Dinner

**Wednesday,
07 September**

SESSIONS & POSTERS

Morning session: **INVASIBILITY OF HABITATS AND IMPACTS**

Chair of the session: Curtis C. DAEHLER

S4

- 09.00 – 09.40 Invited keynote speaker: Philip. E. HULME
(NERC Centre for Ecology & Hydrology, UK)
Islands and Invasions: a Mediterranean Odyssey
- 09.40 – 09.55 Petr PYŠEK, Vojtěch JAROŠÍK, Mark WILLIAMSON, Emili GARCIA-BERTHOU, Daniel SOL
(Academy of Sciences of the Czech Republic)
Factors affecting naturalization success: a global pattern

- 09.55 – 10.10 Elizabete MARCHANTE, Annelise KJÄLLER, Sten STRUWE, Helena FREITAS
(University of Coimbra, Portugal)
Soil microbiological effects of the invasive species *Acacia longifolia*
- 10.10 – 10.25 Joao FERREIRA, Maria A. MARTINS-LOUÇÃO
(University of Lisbona, Portugal)
Exotic *Acacia* species alter soil properties and invasive success in coastal sand dunes
- 10.25 – 10.40 **Discussion**
- 10.40 – 11.15 **Coffee break**
- 11.15 – 11.30 Margherita GIORIA, Bruce OSBORNE
(University College Dublin, Ireland)
Soil seed bank dynamics and the long-term impact of three invasive species
- 11.30 – 11.45 Gabriela WOŹNIAK, Eleanor COHN, Edyta SIERKA
(University of Wolverhampton, UK)
Biotic (floristic) and abiotic conditions associated with *Solidago canadensis* occurrence on post-industrial sites (coal mine sedimentation pools)(Upper Silesia, Poland)
- 11.45 – 12.00 Michele TRÉMOLIÈRES, Gisèle HAAN-ARCHIPOFF, Catherine PRÉVOST, Aurélien BORNET
(University Louis Pasteur, France)
Seasonal dynamics of the colonization of *Elodea* species in running waters of the Alsace Rhine floodplain
- 12.00 – 12.15 Jacques HAURY, Brigitte RUAUX, Julie COUDREUSE
(UMR INRA-Agrocampus, France)
Assessing the variability of colonisation by Water Primrose (*Ludwigia hexapetala*) within an Atlantic marsh
- 12.15 – 12.30 **Discussion**
- 12.30 – 12.45 Zoltán BOTTA-DUKÁT, Vera SZÁNTÓ
(Hungarian Academy of Science, Hungary)
Scale dependent relationship between invasibility and species richness of functional groups in sandy old-field communities
- 12.45 – 13.00 Damian CHMURA, Edyta SIERKA
(Polish Academy of Sciences, Poland)
Invasiveness and phytocoenotic relations of *Impatiens parviflora*: a study of nature reserves
- 13.00 – 13.15 Lindsey NORGROVE
(University of Hohenheim, Germany)
Agents of deforestation or forest advancement ? Impacts of the invaders, *Chromolaena odorata* and *Imperata cylindrica* at the tropical forest - savannah boundary in Central Cameroon
- 13.15 – 13.30 **Discussion**
- 13.30 – 14.30 **Lunch**
- 14.30 – 16.00 **Poster session: ECOLOGICAL IMPACT AND MANAGEMENT**

Afternoon session: **NEW APPROACHES AND TECHNIQUES
IN *FALLOPIA* ECOLOGY AND CONTROL**

Chair of the session: Lois CHILD

S5

- 16.00 – 16.15 Esther GERBER, Urs SCHAFFNER, Craig MURRELL, Marco MORETTI
(CABI Bioscience, Switzerland)
Ecological impact of Japanese Knotweed (*Fallopia japonica*) in Western Europe
- 16.15 – 16.30 Marie S. TIÉBRÉ, Gregory MAHY, Olivier HARDY, John P. Bailey
(Gembloux Agricultural University, Belgium)
Genetic diversity, cytology and morphology in the invasive alien complex *Fallopia* Adans. (Polygonaceae) in Belgium
- 16.30 – 16.45 James M. D. SMITH, Lois E. CHILD, John P. WARD, Markus R. OWEN
(Loughborough University, UK)
Modelling the spatial spread of Japanese Knotweed (*Fallopia japonica*) on a local scale in the United Kingdom
- 16.45 – 17.15 **Tea / Coffee break**

17.15 – 20.00 **Workshop 2 & 3 (optional)**

17.15 – 20.00  **WORKSHOP 2**

Oenothera genus in Europe: invasion through hybridisation (including: collection of *Oenothera* species in Herbarium of University of Silesia)

Moderators: Krzysztof ROSTAŃSKI

Introduction lecture: Krzysztof ROSTAŃSKI
(University of Silesia, Poland)
Introduction to the taxonomy of *Oenothera* in Europe

17.15 – 19.30  **WORKSHOP 3**

New approaches and techniques in *Fallopia* ecology and control

Moderators: Lois CHILD & John BAILEY

Introduction lecture: Djamila H. DJEDDOUR,
H. EVANS, Richard SHAW, Rob TANNER, D. KUROSE
(CABI Bioscience, UK)
Biological control of *Fallopia japonica* (Houtt.) Ronse
Decraene: project update and progress so far

**Thursday,
08 September**

SESSIONS & POSTERS

Morning session: **CONTROL, RISK ASSESSMENT, PREDICTION & LEGAL
INSTRUMENTS - PART 1**

S6

Chair of the session: John BROCK

- 09.00 – 09.40 **Invited keynote speaker:** David M. RICHARDSON
(University of Stellenbosch, South Africa)
Practical biogeography - making invasion ecology understandable to managers and legislators
- 09.40 – 09.55 Alicia PROWSE, Kerry MORRISON
(Manchester Metropolitan University, UK)
Who owns the landscape? Public outreach via collaboration between a plant ecologist and an environmental artist
- 09.55 – 10.10 Carole ROPARS-COLLET, Louis-Pascal MAHÉ, Philippe LE GOFFE, Jacques HAURY, Alain DUTARTRE, Aurélien MILLION
(Agrocampus, France)
Importance of stock externalities in management strategies for invasive species
- 10.10 – 10.25 Gabrielle THIEBAUT, P. GIERLINSKI, J. N. BEISEL
(Paul Verlaine University, France)
Interactions between invasive aquatic plants and exotic/autochthonous macroinvertebrates
- 10.25 – 10.40 Max WADE
(RPS Environmental Consultancy and Giant Alien Team, England)
A review of detailed studies of *Heracleum mantegazzianum*: what lessons can be learned in developing strategies for other alien invasive species?
- 10.40 – 10.55 **Discussion**
- 10.55 – 11.15 **Coffee break**
- 11.15 – 11.30 Richard H. SHAW
(CABI Bioscience, UK)
The impact of European legislation on the biological control of weeds, with particular reference to the UK
- 11.30 – 11.45 Maria TALIK
(University of Silesia, Poland)
Alien plant invasions, LMOs and biodiversity protection. International, EU and Polish legal framework
- 11.45 – 12.00 Timothy L. WIDMER
(European Biological Control Laboratory, France)
Strategies for the use of plant pathogens in invasive weed management

- 12.00 – 12.15 **Paul O. DOWNEY**
(Department of Environment and Conservation, Australia)
Alien plant management under the New South Wales threatened species legislation:
Chrysanthemoides monilifera: a case study
- 12.15 – 12.30 **Sanjay BHATIA, Rajani CHOUDHARY, Manjot SINGH**
(University of Jammu, India)
Current status of invasive weed *Parthenium hysterophorus* (Asteraceae) and impact of defoliation
by the biocontrol agent *Zygotrama bicolorata* (Coleoptera: Chrysomelidae) in Jammu, (J&K),
India

Afternoon session: **INVASIVE SPECIES DATABASES**

Chair of the session: Philip HULME

S7

- 12.30 – 12.45 **Frank KLINGENSTEIN**
(Federal Agency for Nature Conservation, Germany)
Accepting the challenge of invasive alien species: significance, numbers, impact, pathways,
measures and activities in Germany
- 12.45 – 13.00 **Ludmila V. KHORON, Dmitry D. SOKOLOFF, Alexander A. NOTOV**
(Tula Leo Tolstoy University, Russia)
The historical model of the dynamics of alien flora of several regions of Central Russia
- 13.00 – 13.15 **Keith DOUCE, David J. MOORHEAD, C. T. BARGERON, C. W. EVANS**
(University of Georgia, USA)
Invasive.org: providing invasive species information and images at a global level
- 13.15 – 13.30 **Zbigniew MIREK, Barbara TOKARSKA-GUZIŁ**
(Polish Academy of Sciences, Poland)
Plant and fungi invasions in Poland
- 13.30 – 14.30 **Lunch**

14.30 – 15.30



WORKSHOP 4

Invasive species databases: including distribution and negative ecological
and economic effects

Moderators: Philip HULME & Petr PYŠEK

Introduction lecture: Philip HULME

(NERC Centre for Ecology & Hydrology, UK)

Delivering Alien Invasive Species Inventories for Europe: the DAISIE project

Afternoon session: **CONTROL, RISK ASSESSMENT, PREDICTION & LEGAL
INSTRUMENTS - PART 2**

S8

Chair of the session: John BROCK

- 15.30 – 15.45 **Martin KŘIVÁNEK, Petr PYŠEK, Vojtěch JAROŠÍK**
(Academy of Sciences of the Czech Republic)
Predicting invasions by woody species: the importance of history, propagule pressure and species
traits
- 15.45 – 16.00 **Heinke JÄGER, Scott HENDERSON**
(Charles Darwin Research Station, Galapagos, Ecuador)
Does road and trail construction in the Galapagos Islands create plant invasion corridors?
- 16.00 – 16.15 **Llewellyn C. FOXCROFT**
(Savanna Ecol. Res. Unit, South African NP, South Africa)
Integration of invasive species management: lessons from the Kruger National Park, South Africa
- 16.15 – 16.30 **Discussion**
- 16.30 – 17.00 **Tea/Coffee break**
- 17.00 – 17.30 **General discussion & workshops summaries**
- 17.30 – 17.45 **CONFERENCE CLOSE**
- 18.00 – 23.00 **Open-air picnic**

**Friday,
09 September**

FIELD EXCURSION TO KRAKÓW AND WIELICZKA SALT MINE

departure – 8.30
return – 20.00

**Saturday,
10 September**

LONG DISTANCE TRIP: TATRY-PIENINY MTS

departure – 10.09. (Saturday), 8.30
return – 11.09. (Sunday), 20.00 - 22.00

**Saturday,
10 September**

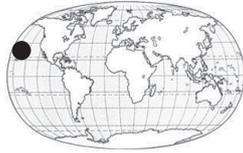
LONG DISTANCE TRIP: BIAŁOWIEŻA NATIONAL PARK

departure – 10.09. (Saturday), 8.30
return – 12.09. (Monday), 17.00 – 18.00

LECTURES

in alphabetical order

INVITED KEYNOTE SPEAKER



Curtis C. DAEHLER

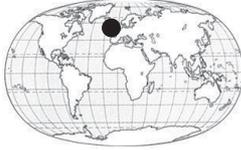
Department of Botany, University of Hawaii, Honolulu, USA

6th Sept.
S1:
10.20-11.00**HAWAII AS A LABORATORY FOR PLANT INVASIONS:
SHIFTING SCIENTIFIC AND HUMAN PERSPECTIVES OVER TIME**

keywords: conservation, Hawaiian Islands, history, human motivation, plant introductions

Most contemporary plant invasions stem from human activities; therefore, studies of human behavior can help us understand current and future trends. Here, I review changes over time in human motivations and perceptions associated with plant introductions and invasions in the Hawaiian Islands, with a view that islands serve as useful models for understanding processes that occur around the world. The earliest Polynesian settlers introduced only a few dozen essential food and fiber plants, one of which became invasive and is now the State Tree of the Hawaii. Plant introductions by early European immigrants (1778-1830) illustrate the desire for economic betterment as well as the influence of nostalgia, a universal human phenomenon. In later decades (1840-1900), a few individuals introduced hundreds of new plants for beautification; most of these introductions are best explained by neophilia. From 1850-1900 a population explosion among feral ungulates caused massive forest decline and erosion, leading sugar cane growers to complain of inadequate water supplies from denuded watersheds. Research indicated that the native forest could not be restored quickly, so thousands of plant species were imported to create new forests. These plant introductions were definitely motivated by a desire to improve ecosystem services. By the 1950s, there was a shift toward recreational uses of forests. Strawberry guava, one of the most serious threats to native ecosystems, was widely planted along forest trails to provide a refreshing treat for hikers. Practitioners of native species and ecosystem conservation face four societal challenges that will continue to feed new invasive plants into the system 1) neophilia and its ability to generate rapid economic gains, 2) pressures to increase economic productivity, 3) nostalgia, and 4) the inability of most people to distinguish native from non-native ecosystems. Laws restricting plant importation are likely to be only partly effective because the first three phenomena are driven by human nature and economics. A practical approach to conserving native ecosystems is discussed.

INVITED KEYNOTE SPEAKER



Philip E. HULME
NERC Centre for Ecology & Hydrology, UK



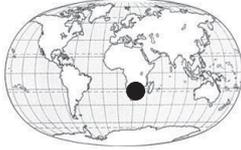
7th Sept.
S4:
9.00-9.40

ISLANDS AND INVASIONS: A MEDITERRANEAN ODYSSEY

keywords: biodiversity, biogeography, exotic plant species, Mediterranean Basin

The ecology of islands is intimately associated with biological invasions. The species composition and community structure of islands is widely recognised to be a function of colonisation rates and it follows that where these have been accelerated by human activities, biological invasions will also play a significant role. Current understanding of the extent, character and consequences of the invasion of islands by non-native species is drawn largely from studies of tropical oceanic islands especially Hawaii. This paper aims to address this imbalance by focusing on the invasion by non-native plants of islands in the Mediterranean Basin. Mediterranean climate regions are particularly susceptible to biological invasions although New World ecosystems appear more susceptible than those of the Mediterranean Basin. Nevertheless, whereas the proportion of the flora of the Mediterranean Basin composed of non-natives has been estimated at only 1%, it is substantially higher for Mediterranean islands. The impact of exotic plants on biodiversity remains poorly documented in the Mediterranean Basin. Several non-native plants are weeds of major economic significance, others may also be hosts of plant pathogens. Both the intensive planting of exotic species and agricultural abandonment significantly increase the risk of invasion by feral crops. Non-native plants may impact on human and animal health, and may have profound environmental consequences, exacting a significant toll on ecosystems. The problems of invasive species are often viewed as those of disturbed and anthropogenic habitats rather than intact ecosystems. However, a unique element of indigenous Mediterranean biodiversity is the anthropogenic component, a distinct subflora that evolved in the Mediterranean. These species occur in varying associations in fields, pastures and on roadsides: habitats typically invaded by non-native plant species.

INVITED KEYNOTE SPEAKER

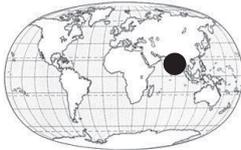


David M. RICHARDSON

Centre for Invasion Biology, Department of Botany & Zoology,
University of Stellenbosch, South Africa8th Sept.
S6:
9.00-9.40**PRACTICAL BIOGEOGRAPHY – MAKING INVASION ECOLOGY UNDERSTANDABLE
TO MANAGERS AND LEGISLATORS**

keywords: invasion ecology, legislation, management, prediction, terminology

Great strides have been made over the past two decades in the field of invasion ecology. We now have a much better idea of why some species are better invaders than others, and what makes ecosystems open to invasion. Invasion ecology is now one of the most popular areas of ecology – witness for example the large numbers of invasion-related papers in top journals and the numerous papers and symposia devoted to invasions at big international conferences. Given the widely acknowledged threat posed by invasive species to biodiversity, scientific research on issues related to invasions is relatively well funded by national and international science foundations. But, is the “good science” that is being done helping us to deal with the problem? In a timely paper, Phil Hulme (2003; *Oryx* 37: 178-193) suggested that we are “winning the science battles, but losing the conservation war”. Other authors have also pointed to the mismatch between scientific research agendas on the topic of invasion ecology and the most urgent requirements of managers and legislators who need to deal with problems of invasive species “at the coal face”. It seems that crucial decisions are being taken without significant inputs from the growing body of literature on invasion ecology. Why should this be? What could and should be done to ensure a closer link between the science of invasion ecology and the needs of managers? This paper explores these issues using examples from several parts of the world. Special attention is given to the situation in South Africa where the recent “Biodiversity Act” has raised some interesting and important questions.



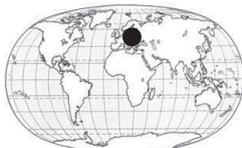
Sanjay BHATIA, Rajani CHOUDHARY, Manjot SINGH
Department of Zoology, University of Jammu, J&K, India


8th Sept.
S6:
12.15-12.30

**CURRENT STATUS OF INVASIVE WEED *PARTHENIUM HYSTEROPHORUS* (ASTERACEAE)
AND IMPACT OF DEFOLIATION BY THE BIOCONTROL AGENT *ZYGOGRAMMA BICOLORATA*
(COLEOPTERA: CHRYSOMELIDAE) IN JAMMU, (J&K), INDIA**

keywords: *Parthenium hysterophorus*, *Zygogramma bicolorata*, biological control, defoliation, impact

Parthenium hysterophorus L. (Asteraceae) is an annual herbaceous plant native to the tropical America. Within the last 100 years it has found its way to Africa, Australia and Asia. It is widely invasive and has become a major problem in India with the weed spreading across majority of the states including the state of Jammu and Kashmir. It is a major crop and pasture weed and also a serious human health hazard causing allergic dermatitis and respiratory ailments. *Parthenium* is a serious problem in Jammu region with the weed spreading to all the six districts. It has achieved the status of worst weed owing to its adverse effects on human beings, livestock, agriculture and biodiversity of the region. Biological control programme involved the introduction of leaf – feeding beetle *Zygogramma bicolorata*. It has successfully established in the region with promising results. Feeding by *Z. bicolorata* causes damage to meristems resulting in shorter height of the primary stem and changed branching pattern. The paper records current distribution and status of this weed in Jammu region, besides notes on bionomics and effectiveness of the biocontrol agent in controlling *Parthenium* has been discussed.



Zoltán BOTTA-DUKÁT¹, Vera SZÁNTÓ²

¹ Institute of Ecology and Botany, Hungarian Academy of Science, Hungary

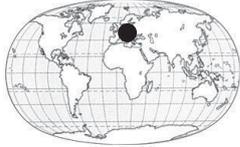
² Department of Plant Ecology and Taxonomy, Eötvös University of Budapest, Hungary


7th Sept.
S4:
12.30-12.45

**SCALE DEPENDENT RELATIONSHIP BETWEEN INVASIBILITY AND SPECIES RICHNESS
OF FUNCTIONAL GROUPS IN SANDY OLD-FIELD COMMUNITIES**

keywords: old field, succession, invasibility

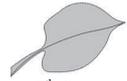
According to Elton's classical hypothesis, there is a negative correlation between species richness and invasibility. Its possible explanation is the better resource utilisation of species rich communities. This hypothesis has been tested by lot of researches, but the results are ambiguous and strongly depend on scale and approach (i.e. survey or experiment). Different scales can mean different plot size and different size of studied area (and consequently different heterogeneity). These two aspects of scale often change in parallel. In our case the plot size was constant (1 by 1 m), and only the other aspects of the scale was changed. Data collected from 1, 5, 10, and 30 years old, sandy old-fields, and they analysed together and separately by age. Since former studies pointed out that resource utilisation influenced by the functional types, we studied the correlation between invasibility and richness of certain functional types, instead of the correlation between total native species richness and invasibility. Three alien species occur in the studied area: *Ambrosia artemisiifolia*, *Asclepias syriaca*, and *Erigeron canadensis*. They belong to different life forms, therefore we hypothesised that they use different resources and compete with different functional types. That is why three species were analysed separately. Similarly to the previous studies, we received strong scale dependence of results. If age groups were analysed separately only few significant correlation were found, but if all data involved to the same analysis many significant relationships were revealed. *Ambrosia* and *Erigeron* belong to the functional group of summer annuals. As expected, they negatively correlate most of the functional groups, except winter annuals, which use resources in other part of the year. On the other hand, *Asclepias* positively correlates with the species richness of perennial functional types.



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7th Sept.

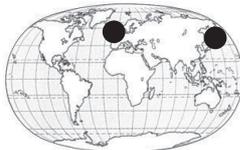
S4:

12.45-13.00

INVASIVENESS AND PHYTOCOENOTIC RELATIONS OF *IMPATIENS PARVIFLORA*: A STUDY OF NATURE RESERVES

keywords: *Impatiens parviflora*, biodiversity, impact, Poland

In 13 woodland nature reserves situated in southern Poland, 75 permanent study plots were established. In these plots, 10m x 10m divided into 100 subplots of 1 m² and randomly placed in various forest communities, percentage cover of herbaceous and moss species was recorded with the use of 10 percent intervals. Impact of highly invasive plant species, native of Asia small balsam *Impatiens parviflora* DC, on indigenous species was estimated using concept of alfa-diversity (species richness within sites), and beta-diversity (species richness among sites). The subplots with a presence of *I. parviflora* were compared with those where only native resident species occurred. The studies revealed that small balsam *I. parviflora* is an indicator of local high biodiversity what is caused probably by the disturbance and the influx of non-forest species into forest vegetation. On the other hand the plots with higher number of subplots occupied by the species studied were more species-poor. Comparison of beta-diversity among the study plots gives different results. In the study plots characterized by higher species richness beta diversity tended to be lower in case of subplots with the absence of *I. parviflora*. The more species-rich forest communities are, the less its impact is. Small balsam seems to take advantage from existence of bare ground and thinned tree stands or canopy gaps in forest phytocoenoses what is concordant with results of other experimental and theoretical studies on invasibility of plant communities. Its occurrence is hampered by clonal plants as native and expansive sedge *Carex brizoides* even in favorable light conditions. The study was partially funded by KBN, no. project 3 PO4 G 093 25.



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7th Sept.

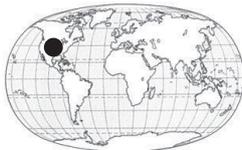
W3:

17.15-17.30

BIOLOGICAL CONTROL OF *FALLOPIA JAPONICA* (HOUTT.) RONSE DECREAENE: PROJECT UPDATE AND PROGRESS SO FAR

keywords: *Fallopia japonica*, weed biological control

First introduced to Europe and North America from its native Japan as an ornamental and fodder plant in the 19th Century, Japanese knotweed (*Fallopia japonica*) subsequently escaped from gardens to become one of the most persistent and aggressive weeds in its non-native range. Today, it is distributed throughout mainland Europe, the USA, Canada, New Zealand and parts of Australia and is responsible for widespread environmental and economic damage. In the UK, *Fallopia japonica* is classed as controlled waste under the Environmental Protection Act 1990 and is one of only two weeds restricted under the Wildlife and Countryside Act 1981. Currently, the most common way to treat Japanese knotweed is through repeated applications of costly chemical herbicides and a recent government review has estimated the cost of nationwide control at £1.56 billion. Believed to be clonal, Japanese knotweed is deemed to be a particularly susceptible target for classical biological control, an approach which offers the only long-term, cost effective and sustainable solution to the problem. After 13 years in development, this pioneering project for the UK began in earnest in 2003, thanks to a consortium of stakeholders. In this paper, we present a profile of the weed and its impacts, report on molecular characterization pointing to its original source and detail the findings of extensive Japanese field surveys. We also introduce the natural enemies studied so far in quarantine, highlighting those still under consideration, whilst underlining prospects for the future.



Keith DOUCE, David J. MOORHEAD, C. T. BARGERON, C. W. EVANS

The University of Georgia; R. C. Reardon, USDA Forest Service, USA



8th Sept.
S7:
13.00-13.15

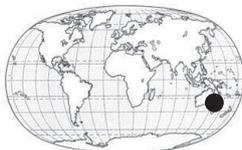
INVASIVE.ORG: PROVIDING INVASIVE SPECIES INFORMATION AND IMAGES AT A GLOBAL LEVEL

keywords: images, checklists, database, internet, outreach

Proper identification of invasive species and associated organisms are important for adequate monitoring and detection activities, as well as to support proper management decisions. Invasive.org (www.invasive.org) is a web-accessible archive of high quality images driven by a fully-searchable taxonomic database built-around the successful ForestryImages (www.forestryimages.org) framework. Images in the system can be downloaded in the desired resolution, format and file size needed by the user and can be used with no royalties and no fees for all educational applications. Images in these systems are TOOLS that are available for use in users' applications!

The system was developed as a portal to high resolution images with links to species-based information. Invasive.org is one of fifteen (15) websites maintained by the Bugwood Network (www.bugwood.org) on a broad range of topics, including invasive species, forestry and forest health, and entomology dealing with both natural systems and more directly managed systems. Invasive.org and the associated ForestryImages system make over 25,000 images taken by over 650 photographers on 4,000+ subjects available to users. During the period of Oct 1, 2003 through September 30, 2004 (US Federal Fiscal Year), the Bugwood Image systems received over 33 million hits and served nearly 14 million pages of information to 2.3 million users. The systems are being used.

The initial focus was North America, but the scope and content of both images and information is much broader than North America. The Bugwood Network is cooperating with a wide array of US and Non-US-based agencies, individuals and organizations with significant collaborations across Europe. The content of the systems and the user base continues to expand. We invite you to visit, utilize and contribute to these sites.



Paul O. DOWNEY

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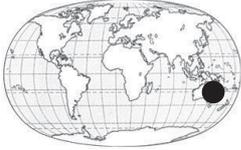


6th Sept.
S3:
17.45-18.00

THE IMPORTANCE OF LONG-TERM STUDIES IN THE MANAGEMENT AND ECOLOGY OF ALIEN PLANTS – SCOTCH BROOM (*CYTISUS SCOPARIUS*) 19 YEARS ON

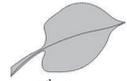
keywords: Long-term study, *Cytisus scoparius*

Long-term studies are rare in ecology, and even more so in the study of alien plant invasions. However, information on the long-term demographics of alien plant invasions is crucial if we are to manage them effectively. Nineteen years ago an experiment was established to examine the invasion demography of the alien shrub *Cytisus scoparius* (L.) Link (Fabaceae), at Barrington Tops, New South Wales, Australia. Individual plants were tagged and monitored through time from a series of different invasion stages or starting points - being: i) initial invasion, ii) invaded, and iii) long invaded. By joining these different invasion stages together in a time-line sequence, longer-term trends can then be derived (ie the initial invasion stage combined with the invaded stage). This process can also allow for the examination of multiple generations (ie 1st versus 2nd generation) - here, the density of plants was reduced between the initial and the 3rd generation. In addition, by following the fate of individuals through time important information on alien plant demography can be obtained. For example, information on seedling survivorship revealed that the probability of a seedling becoming a flowering individual (>3 years old) was <2%; and the maximum plant age was >20 years - a value greater than the maximum age estimated from counting growth rings. However, the value of such long-term data can be greatly enhanced when combined with short-term ecological data (ie seed production). Such combinations can lead to more effective management of alien plants, through both better informed management strategies and predictive models.



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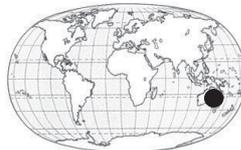


8th Sept.
S6:
12.00-12.15

ALIEN PLANT MANAGEMENT UNDER THE NEW SOUTH WALES THREATENED SPECIES LEGISLATION: *CHRYSANTHEMOIDES MONILIFERA*: A CASE STUDY

keywords: threat abatement plan, native species, model

The management of invasive alien plants is difficult due to the scale of the problem (ie the area occupied, the range of habitats invaded, their continued persistence and rate of spread), the limited resources available to control them (financial and human), and obtaining an accurate assessment of their impacts. The South African coastal shrub *Chrysanthemoides monilifera* (L.) T.Norl. (Asteraceae) is one of Australia's 20 worst alien plants. Within New South Wales, it occupies >80% of the coastline and threatens many native plant communities. To date, National, State and regional strategies have been developed to address the problem. However, these broad management strategies provide little direction for on-ground management. A new strategy has been developed to focus alien plant management on specific outcomes – in this case, plant conservation. This strategy was developed under the NSW *Threatened Species Conservation Act 1995* - alien plants can be listed as Key Threatening Processes (KTP) under the Act. Following the listing of a KTP, a Threat Abatement Plan (TAP) is then developed, which outlines the native species affected and strategies to reduce the threat posed by the KTP, in this case invasion by an alien plant. In the past, the lack objective data on the impacts of alien plants on native species has greatly hampered our understanding and management options. The draft *C. monilifera* TAP presents a series of models which identify the species and sites that are most affected by the invasion of this alien shrub in NSW. This process identified approximately 150 species at risk from the invasion of *C. monilifera*. The combination of the species and the site models can direct resources and focus control efforts to provide on-ground outcomes in areas where the impacts to native species are greatest, independent of land tenure.



Emilie-Jane ENS, Kristine FRENCH

Institute of Conservation Biology, University of Wollongong, Australia

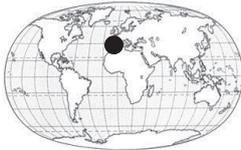


6th Sept.
S3:
17.30-17.45

A CRUMBLING HEALTH SYSTEM: EXOTIC BITOU BUSH AFFECTS THE FITNESS AND HEALTH OF AUSTRALIAN COASTAL FLORA

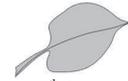
keywords: Bitou Bush, Australia, fitness, plant strategies, impact

During the 1960s and 1970s, *Chrysanthemoides monilifera* (L.) spp. *rotundata* (DC.) Norl. (South African bitou bush) was extensively planted on the east coast of Australia for dune stabilization following sand mining. Subsequently, bitou bush has naturalized and spread beyond initial plantings and into native ecosystems. This study sought to determine whether the health, fitness and survival strategies of a range of indigenous flora differed in bitou bush invaded sites compared to the relatively native condition. Number of inflorescences was employed as a surrogate of fitness. Plant health was analyzed by measurements of chlorophyll fluorescence. The ratio of reproductive buds to vegetative buds (output ratio) was adopted as an indicator of survival strategy based on the r-K selection continuum. Results suggested that species differed in their response to the pressure imposed by exotic species dominance. Lower fitness, health and a shift in *Monotoca elliptica* (medium sized Epacridaceous tree) survival strategy towards K-selection was indicated by a significantly lower output ratio and reproductive output. A shift towards persistence rather than reproduction and poorer health was also demonstrated by the shrub *Correa alba* (Rutaceae). Interestingly, bitou bush did not seem to affect the fitness, health or survival strategy of *Lomandra longifolia* (Lomandraceae). Therefore, the invasion of bitou bush has differential impacts on the survival and sustainability of different species. The decrease in health and shift in survival strategies found in two of the three species studied suggests that bitou bush poses a significant threat to the sustainability of coastal ecosystems. In these cases, more resources are likely to be directed to persistence of the mature individuals rather than promoting the development of seedbanks. Hence, the invasion of bitou bush is likely to have long-term impacts on the structure of these communities.



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7th Sept.

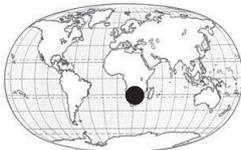
S4:

10.10-10.25

EXOTIC ACACIA SPECIES ALTER SOIL PROPERTIES AND INVASIVE SUCCESS IN COASTAL SAND DUNES

keywords: *Acacia*, dunes, soil, microbiota

In Portugal, in the past, *Acacia* species were introduced with the objective to stabilize sand dunes. However, in some places *Acacia* became invasive, menacing native flora, with some areas being dominated by acacia monocultures. As coastal sand dunes are ecosystems with typically low nutrient, this work was established to test two hypotheses. Our first hypothesis was that the presence of *Acacia* lead to a change in soil abiotic and biotic properties, along the years. In order to demonstrate this, a survey was conducted on soil properties, including nutrient availability and microorganisms functional diversity, and on plant nutrient and mycorrhizal status, both on *Acacia* and native species. Two distinct areas located at the south and center-north of Portugal were chosen to perform this survey, both with a mesomediterranean climate, but with different annual precipitation values. The second hypothesis was that the impact of *Acacia* in the soil, including on soil biotic communities, may mediate impacts not only in native vegetation but also in *Acacia* itself. In order to demonstrate this later hypothesis we performed a laboratory experiment, where we evaluated *Acacia* germination and growth on two distinct types of field soils: the one collected under *Acacia* and the other from outside *Acacia* stand. In order to separate biotic from abiotic factors, each type of soil was either sterilized or non-sterilized. Significant differences were found in *Acacia* germination and growth according to the type of soil tested. The data suggest a negative effect of *Acacia* presence on its own germination rates but a positive effect on its own growth rates. Possible explicative mechanisms will be discussed in order to explain the low demographic status of present day acacia stands, particularly in the southern region of coastal sand dunes.



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Savanna Ecological Research Unit, South African National Parks, P/Bag x 402,
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8th Sept.

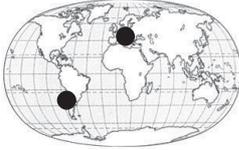
S8:

16.00-16.15

INTEGRATION OF INVASIVE SPECIES MANAGEMENT: LESSONS FROM THE KRUGER NATIONAL PARK, SOUTH AFRICA

keywords: management, objectives, adaptive, invasive species

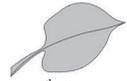
A core principle of adaptive management emphasises implementation, re-examination and refinement for continuous self-improvement. Through the development of various strategies, the Kruger National Park (KNP) has attempted to manage invasions in a comprehensive approach. Some of these components include the Working for Water programme, the development of thresholds of potential concern (TPCs), strategic adaptive management (SAM) and the development of management objectives. The integration thereof has however poorly implemented. Many scientists and managers do not fully understand the links and interactions between the various components. Further, the links between the thresholds of potential concern and physical clearing efforts are poorly defined in certain circumstances. Although the development of the adaptive management framework and updated KNP management objectives has alleviated this to some extent, this problem still persists. If management is to be successful in the long-term, all the components of a management plan need to be fully integrated. Various accounts have described the development some of these processes, providing a point of reference for further integration. This paper aims to contextualise the various components of the KNP's management approach by placing emphasis on the linkages between all the components. Further, it builds on new understanding of the invasion process in the KNP ecosystem.



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6th Sept.

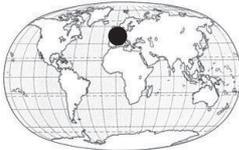
S2:

16.15-16.30

RECONSTRUCTING THE SPREAD OF INVASIVE SPECIES USING HERBARIUM DATA - A CASE STUDY FROM CHILE

keywords: herbarium data, invasive plant species, flora of Chile, spatial and temporal pattern

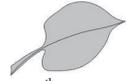
Reconstructing the spread of invasive species using herbarium data - a case study from Chile Herbarium data are an important source of information not only for taxonomy but also for biogeography and ecology. In most of the collections invasive species are included. This information can help to reconstruct the spread of alien species and to describe spatial and temporal pattern within larger areas. The temporal and spatial distribution of herbarium specimens of vascular plants are examined basing on the herbarium data from the Concepcion University Herbarium (CONC). The distribution of alien species within Chile basing on the herbarium data is reconstructed and compared with distribution data from other sources. This comparison helped to check the importance of sampling effects for the results. The relation between native and alien species is evaluated and additional methodological problems using herbarium data are discussed.



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7th Sept.

S5:

16.00-16.15

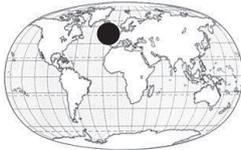
ECOLOGICAL IMPACT OF JAPANESE KNOTWEED IN WESTERN EUROPE

keywords: *Fallopia japonica*, invasive species, ecological impact

Fallopia japonica (Houtt.) Ronse Decr. (Japanese knotweed) is considered to be one of the most serious invasive exotic weeds in Europe, causing significant damage to native ecosystems. However, with the exception of competitive exclusion of native vegetation, its suggested ecological impact is poorly supported by experimental studies.

In 2004, we started to investigate the ecological impact of Japanese knotweed in selected areas of France, Germany and Switzerland. Specifically, we aim to assess its effects on vegetation and invertebrate diversity, on soil parameters and on higher trophic levels (e.g. changes in predator fitness) in natural and semi-natural habitats. Ten locations were selected along river courses with different levels of Japanese knotweed infestations, and permanent study plots randomly established in vegetation invaded by Japanese knotweed, as well as in vegetation which can potentially be invaded by Japanese knotweed: open vegetation dominated by grasses and forbs, and bush-dominated vegetation.

The first results indicate that invasion by Japanese knotweed does not only have dramatic effects on native vegetation, but also on invertebrate abundance. Native plant species richness is significantly lower on plots invaded by this exotic plant species, compared to uninvaded plots. We also found a significant negative correlation between the plant species richness and Japanese knotweed shoot density. Analyses of the invertebrate assemblages indicate that overall abundance in plots invaded by Japanese knotweed is reduced by almost 50%, compared to control plots. However, invertebrate taxa differed widely in their response to Japanese knotweed invasion. Results from an ongoing experiment conducted under greenhouse conditions indicate that the high competitive ability of Japanese knotweed is not based on allelopathy, but rather on direct competition for light and other resources.



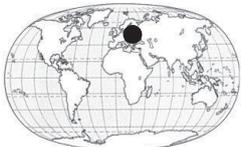
Margherita GIORIA, Bruce OSBORNE
Department of Botany, University College Dublin, Ireland


7th Sept.
S4:
11.15-11.30

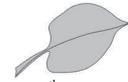
SOIL SEED BANK DYNAMICS AND THE LONG-TERM IMPACT OF THREE INVASIVE SPECIES

keywords: invasive species, biodiversity, seed bank

The accumulation of viable seeds in the soil seed bank and alterations in soil seed bank diversity, composition and abundance represent major factors in determining the success of certain invasive species. Assessment of the impact of three invasive herbaceous species on biodiversity (*Heracleum mantegazzianum*, *Gunnera tinctoria* and *Fallopia japonica*) was investigated using a combination of floristic and seed bank analysis. A stratified random sampling design (n=20) was adopted and samples were collected in May and October 2004 from three sites per species from three depth categories (A=0-5cm, B=5-10cm, C=10-15cm). Preliminary results showed that species richness declined in both the aboveground vegetation and in the seed bank, the impact varying with the site and the invasive species examined. Seedling density of native species usually declined in the invaded seed banks and species composition was profoundly altered at each site. *H. mantegazzianum* comprised approximately 60% of the seed bank, with a mean value of 9,588 seedlings m⁻². *G. tinctoria* represented 10.40% and 33.89%, respectively, of the invaded seed banks, with a mean value of 7,639 seedlings m⁻², whereas *F. japonica* does not establish any seed bank in the British Isles. Of the species present in the seed bank, grasses showed the greatest decrease both in composition and abundance. A general increase in the abundance of the Juncaceae was recorded in each invaded seed bank, particularly *Juncus effusus* and *J. bufonius*, although these species were not recorded in the above ground vegetation. Observation of seed germination patterns, based on the timing of germination and depth-dependent analysis, indicated a transient seed bank for *H. mantegazzianum*, whereas *G. tinctoria* formed a persistent seed bank. Despite not producing viable seeds, *F. japonica* had the greatest impact on both the vegetation and the seed bank.



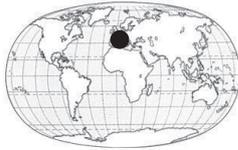
Zigmantas GUDŽINSKAS
Institute of Botany, Laboratory of Flora and Geobotany, 08406 Vilnius, Lithuania


6th Sept.
S1:
12.45-13.00

FECUNDITY OF *LUPINUS POLYPHYLLUS* IN RELATION TO HABITATS AND AGE OF INDIVIDUALS

keywords: invasive, population, fecundity, herbochronology

Lupinus polyphyllus Lindl. (Fabaceae) is a perennial plant species native to North America, that has been introduced to Europe in the mid-19th century. Its cultivation in Lithuania probably started in the beginning of the 20th century and in 1930s it was recorded for the first time as escaped from cultivation. In the middle of the 20th century *L. polyphyllus* was recommended for re-vegetation and re-habilitation of disturbed sandy soils, for fire control belts in forests, as a fodder plant for game animals, or it was simply dispersed for enrichment of the local flora and landscape scenery. Soon this species became naturalized, and its invasion into various types of habitats, mainly on dry sandy soils, started. Nowadays *L. polyphyllus* is a widespread alien species in Lithuania. Like other leguminous plants, make symbiosis with nitrogen fixing bradyrhizobias, thus supplying large amount of nitrogen compounds to the topsoil layer of habitats. In habitats invaded, alterations of soil fertility take place and that triggers fast irreversible changes of plant communities and entire ecosystems. Thus, this highly invasive and competitive species could be ranked as a transformer, which threatens ecosystems and their biodiversity. Populations of *L. polyphyllus* occurring in various types of habitats (forests, meadows, sands, etc.) were investigated. Plant height and inflorescence length were measured; number of shoots, leaves, branches, flowers, pods and seeds were counted. Dependence of development and fecundity of *L. polyphyllus* upon ecological factors is analysed and discussed. Actual age of individual plants of a population was determined applying the method of herbochronology (by annual rings in root xylem). Population age structure and relation of the age of individuals with fecundity and morphological parameters are discussed.



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7th Sept.
S4:
12.00-12.15

ASSESSING THE VARIABILITY OF COLONISATION BY WATER PRIMROSE WITHIN AN ATLANTIC MARSH

keywords: *Ludwigia*, invasion, marsh, phenology, biomass

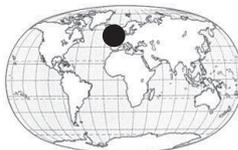
Within the River Vilaine Basin (France, Brittany), aquatic plant invasions are a recent but serious problem. Thus investigations on *Ludwigia hexapetala* (Water Primrose) have been performed in a heterogeneous marsh proposed as an European Union Site of Interest (Natura 2000 network), in order to manage the whole site. The aims were to assess where this invasive helophyte developed and to show possible competition effects with native plants. We also intended to quantify both cover and biomass (by cropping 5 quadrats in apparently homogeneous areas), to analyse plant structure and point out its phenoplasticity. Its distribution was very heterogeneous depending on water level and community competition, but it is able to develop terrestrial forms. A multidimensional analysis led to order the communities with regards to possible invasion. Almost 20 % of the total area had some *Ludwigia*, even within *Phragmites* or *Carex* communities.

In 2003, late autumn crops showed large biomass up to 830 grams of dry weight per square meter (gDW/m), and a relationship between cover and biomass has been showed.

In 2004, detailed studies of biomass and phenology within 3 belts around a pond showed differences between three morphological populations: (i) creeping (on water surface and then on mud), (ii) erected in almost pure population and (iii) mixed with other helophytes. Maximum biomasses were observed in belt (ii): 532 gDW/m in April to 1318 gDW/m in November. The two other belts had lower standing crops.

For both years, the first population showed very branchy plants, with many roots (26 % in July 2004). The two other populations were erected with less branches, more stems and roots (8 % at the same date), and flowered sooner with more abundant flowers.

These results have been presented to managers and we pointed out the difficulties to regulate the invasion in the whole area.



Philip HULME

NERC Centre for Ecology & Hydrology, UK



8th Sept.
W4:
14.30-14.45

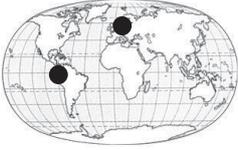
DELIVERING ALIEN INVASIVE SPECIES INVENTORIES FOR EUROPE: THE DAISIE PROJECT

keyword: alien invasive species, inventories, databases, Europe

Effective control of invasive alien species has been hampered by the lack of a comparable spatio-temporal data on the distribution and spread of species across different regions. The European Union has recently established a research programme (DAISIE) with the primary goal of developing an inventory of alien species. DAISIE will deliver a European "one-stop-shop" for information on biological invasions in Europe. It will bring together:

- * The European Alien Species Expertise Registry: a directory of researchers and research
- * European Alien Species Database: including all known naturalized alien species in Europe
- * European Invasive Alien Species Information System
- * Species Distribution Maps and Spatial Analysis

DAISIE will be a pivotal instrument in developing a Europe-wide strategy that encompasses both the geographical scale of the problem and unites the study of different taxa in marine, freshwater and terrestrial environments. DAISIE will address the need for a regional network of invasive alien species information. With direct access to national knowledge bases throughout Europe, those addressing the invasive alien species challenge could easily obtain data on which species are invasive or potentially invasive in particular habitats, and use this information in their planning efforts



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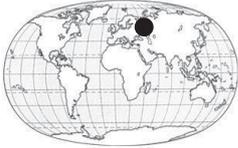


8^h Sept.
S8:
15.45-16.00

DOES ROAD AND TRAIL CONSTRUCTION IN THE GALAPAGOS ISLANDS CREATE PLANT INVASION CORRIDORS?

keywords: Galapagos, disturbance, invasion corridors, monitoring

The aim of this study is to determine the extent to which introduced plant species may use trails and roads to invade the Galapagos National Park (GNP). Monitoring of all plant species in permanent plots across a range of habitat and disturbance conditions has been conducted at two sites running through the GNP on Santa Cruz Island over the last 4 years. One site is a gravel road extending from the agricultural semi-humid zone (220m above sea level) to the arid zone at sea level. The second is a dirt trail extending from the agricultural zone (530m) to the highest point of the island (860m). Although native vegetation continues to dominate, the roads and trails contain considerably more introduced species than adjacent intact vegetation. In the case of the dirt trail, twice the number of introduced species occurred on the trail compared to the adjacent intact vegetation (14% of total species). A different trend occurred along the gravel road, where the proportion of introduced species in the adjacent intact vegetation is now very similar to the proportion on the road (9% compared to 5-11%) but was only 1% at the beginning of the monitoring. Over the same monitoring period, the proportion of endemic species in the intact vegetation decreased from 37-24%. Since these findings are of great conservation concern, the results will be correlated to disturbance factors to address the question whether these observations indicate temporary successions or permanent replacement of native and endemic plant species. Results from ongoing monitoring will help formulating recommendations to the Galapagos National Park Service for control actions. Recommendations will also account for the costs and expertise required to provide the monitoring and analysis for future trail and road building. This is necessary to ensure the National Park's integrity and therefore the protection of the native and endemic plant species of Galapagos.



Ludmila V. KHORON¹, Dmitry D. SOKOLOFF², Alexander A. NOTOV³

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8th Sept.

S7:

12.45-13.00

THE HISTORICAL MODEL OF THE DYNAMICS OF ALIEN FLORA OF SEVERAL REGIONS OF CENTRAL RUSSIA

keywords: alien flora, invasion status, invasion history, wavelet analysis

The question of the dynamics of alien flora in the historical pattern of its formation is actively discussed in special literature (Jäger, 1988; Игнатов et al., 1990; Pyšek, 2003). The growth of interest towards this problem is explained by the willingness to model the course of the invasion process and clarify the possibilities of prognosticating its result. Alien flora also serves as a model object, which can be used as an example of detailed reconstruction of contemporary florogenetic processes.

In spite of the existence of the considerable amount of information on the regional alien floras, the main difficulty in the systematization of historical data lies in the lack of sufficient factual database. In the conditions of the uneven collection of material, the data from adjacent territories can help clarify the situation. However, it is not yet possible to eliminate the problem of the insufficiency of factual data completely. Some methods of mathematical processing could provide some additional possibilities.

We have created the databases of alien flora of two regions in Central Russia – the Tver and Tula Regions which covers the period from 1804 to 2004. They include a list of the species of alien flora as well as a time scale with a step in one year and a database. The database is a series of tables in the squares of which the invasion status for the definite year is indicated. So, every line of the table is a row of two hundred numerical meanings which shows the dynamics of the change of invasion status of every species.

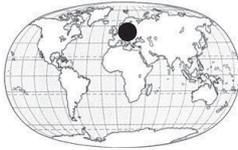
Schroeder's qualification, which has become traditional of Eastern European florists, has been used for characterizing the invasion status (Schroeder, 1969): Ephemerophytes, Colonophytes, Epekophytes and Agriophytes. According to international standards the following correspondences apply: Casual alien plants, Naturalized plants, Invasive plants and Transformers (Pyšek et al., 2004). Each group is correlated with a definite numerical meaning (1, 2, 3 and 4). The absence of the species on the territory is indicated by «0». If the invasion status is unclear, it is indicated by «?»

In the Tver Region ($S = 84,300 \text{ km}^2$) 513 alien species were registered, and 389 alien species in the Tula Region ($S = 26,500 \text{ km}^2$).

The mathematical processing of database has been undertaken. In the course of processing, interpolation was undertaken, which has allowed to eliminate the gaps in meanings of invasion status, to exclude question marks to the maximum degree, eliminate subjectivism connected with the uneven rate of investigation of the territories in the different periods of time. The mathematical processing of data was undertaken in three stages. The first stage included data interpolation, which meant substitution of question marks with numerical meanings approximated to real meanings in accordance with the developed algorithms. The second stage included the calculation of integral indexes and drawing graphic models on the basis of interpolated meanings. The third stage consisted in the "smoothing out" of the acquired trends of invasion status of alien flora with the help of wavelet analysis. This mathematical method is used in analyzing rows of observation in which data is supplied with breaks quite often. It is successfully used in astronomy and meteorology (Sokoloff et al., 1997). The purpose of wavelet analysis is the neutralization of breaks connected with the uneven investigation of flora, which modifies the exposed trends.

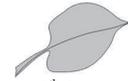
On the basis of the processed data, which shows dynamics of alien flora in the last 200 years the following conclusions, can be made:

1. Average rate of enrichment of alien flora in the regions is comparatively slow and stable (12,5-15 species in 10 years).
2. The number of species which modify their invasion status is comparatively stable (10 species in 10 years).
3. The rate of enrichment of alien flora by new species and the modifications of their invasion status are insignificantly connected with the level of industrial development of the territory in the exact period of time. The idea that the increase in the industrial development of the region significantly influences the number of newly introduces species reflects the uneven character of floristic investigations in the different periods of time.



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8th Sept.
S7:
12.30-12.45

ACCEPTING THE CHALLENGE OF INVASIVE ALIEN SPECIES: SIGNIFICANCE, NUMBERS, IMPACT, PATHWAYS, MEASURES AND ACTIVITIES IN GERMANY

keywords: invasive alien species, research, implementation, legislation, Germany

Considerable national efforts have been made in recent years to address the challenge of invasive alien species (IAS) in Germany. Results of nationally conducted, founded or supported projects are presented giving a comprehensive overview on science and implementation related activities on a national level.

The analysis of reasons of threat indicates that IAS are be a lower threat factor for biodiversity in Germany than in other parts of the world. As for plants, only 43 of all 851 red listed species are threatened by IAS (Korneck et al. 1998), being 1.4% of all reasons of threat.

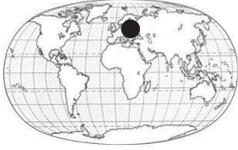
Annotated checklists of alien plant and animal species have been conducted. The results show that 1.149 alien animal species are known, 264 of them established, 443 reported only in the past and 442 with unknown status. 1.233 alien species of higher plants are recorded from Germany, 228 have been introduced with traditional land use practises before 1492 (Archaeophytes), of which ¼ are endangered nowadays. From the 1.007 neophytes (introduced after 1492) 383 are established (~ 11% of all 3.383 established species) and 624 are locally established, occur casually or rarely.

A national survey of regional and local conservation agencies shows that at about 25 plant species are invasive (= threatening biological diversity), but only four species/groups present over 50% of all records (*Heracleum mategazzianum*, *Impatiens glandulifera*, *Fallopia spec.*, *Solidago gigantea* & *S. canadensis*). In 39% of all cases control measures are taken, whereof only 23% are „successful“. Their costs are at least 1.5 Mio. €/a.

To improve the effectiveness of measures, the internet handbook “NeoFlora” has been developed, containing general information on ecology, effect and legislation of IAS and fact sheets of 32 species (www.neophyten.de). Discussion forums enable users to chair experiences e.g. on successful control measures. Up to date information can be distributed to scientist, voluntary floristic experts, governmental authorities and other interest groups by an mailing list comprising more than 1.000 entries. In future, both instruments should be enhanced to an early warning system. A national list of experts has been developed within the Nordic-Baltic Network on Invasive Species (www.sns.dk/nobanis). Available data on alien plant and animal species will be included there as well as in the EU DAISY project.

An economic assessment indicates that 20 alien plant and animal species cause 156 Mio. €/a in Germany, the species most costly is *Ambrosia artemisiifolia*. Fundamentals for a national strategy on IAS have been worked out analysing national and international legislation and administrative responsibilities and suggesting improvement and co-operation between all sectors involved in the introduction and management of IAS.

Since ornamentals (25% of all introductions) and their ongoing secondary releases are regarded as the main reason for their spread, measures have to focus on the prevention of introduction and secondary spread. Therefore, a risk assessment scheme for release permissions has been elaborated.



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8th Sept.

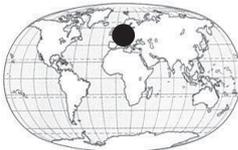
S8:

15.30-15.45

PREDICTING INVASIONS BY WOODY SPECIES: THE IMPORTANCE OF HISTORY, PROPAGULE PRESSURE AND SPECIES TRAITS

keywords: woody species, prediction, forestry

Woody species are frequent invaders with a high impact and often change ecosystem functions of invaded communities. Detailed information on their ecology, geography, and history of introduction makes them a convenient model group for testing the principles of plant invasions. The present paper is based on the DAWIS (Database of Alien Woody species with special regard to alien Invasive woody Species in the Czech Republic) data set, covering 1692 trees and shrubs planted in this country. A case study was conducted, using 28 species from the database that are used in forestry and for which there is a sufficiently detailed information on the date of introduction, date of escape from cultivation and extent of planting. The probability of escape from cultivation was affected by the year of introduction and number of planting areas, with the model explaining 39% of variance, misclassifying only three species, and both variables having a comparable significant effect. Model for the probability of naturalization provided less straightforward results and misclassified eight species. This indicates that predictive power of the year of introduction and planting variables decreases with proceeding naturalization, reflecting that once the species escapes from cultivation, propagule pressure from wild populations adds to that from planting. The database was further used to predict the impact of woody species and test it by using two previously developed risk assessment schemes: Australian Weed Risk Assessment Model (WRA) and North American Decision Tree, the latter developed specifically for woody species. The results of the application of these two models to Central European woody plants are reported. All 17 invasive species but only two of 31 occurring as casuals and one of 123 species not escaping from cultivation were rejected by WRA model. The reliability of Decision Tree Model was much lower. Results for naturalized species were less reliable and are discussed.



Eva KÜSTER, Ingolf KÜHN, Stefan KLOTZ

UFZ - Centre for Environmental Research, Theodor-Lieser-Str. 4, Halle, Germany



6th Sept.

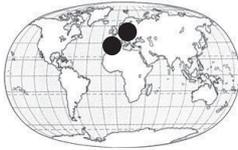
S1:

11.00-11.15

WHICH TRAITS MAKE AN ALIEN INVASIVE?

keywords: plant traits, Germany, successful invaders, risk analysis

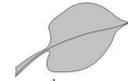
Biological invasions are considered to be one of the major threats to biological diversity. To come up with an effective prevention framework for biological invasions, one of the necessary points is identifying traits which make a plant species invasive. Thus it might be possible to restrict the introduction of species with relevant traits. We analysed the complete naturalised post 1500 alien flora of Germany according to BiolFlor and defined invasions success by (i) the occupancy (i.e. the frequency of occupied grid cells in Germany) and (ii) the degree of naturalisation in Germany (naturalised in semi-natural vegetation or naturalised in anthropogenic vegetation). Using over 80 different traits, we used several different methods to identify relevant traits for invasion success – including corrections for phylogeny. The analyses yielded that most of the available traits were not significantly related with invasion success. Of these, morphological traits are less important for the success of plant invaders while ecological traits such as niche breadth, habitat, and range are more important. Thus there is a manageable number of easy characteristics that could be incorporated into a risk assessment.



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6th Sept.

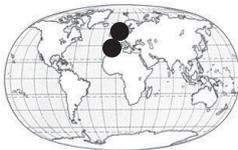
S1:

11.15-11.30

ECOPHYSIOLOGICAL RESPONSES OF INVASIVE VS NATIVE PLANT SPECIES IN COASTAL DUNE ECOSYSTEMS (PORTUGAL)

keywords: plant invasion, sand dunes, water relations, stable isotopes

Sand dunes are habitats of great nature conservation interest, with a very characteristic and rich flora. Species like *Acacia* spp. have been introduced in the past, with the objective to stabilize sand dunes. However, some of these species became dominant, reducing native species density and biodiversity, causing serious ecological problems. It is our aim, to present the aspects related to the ecophysiological patterns, focusing on microclimate, gas exchange and water relations of invasive and native species. In particular we want to determine the competitiveness or/and surviving of both invasive and native species in relation to water, which is crucial for the interpretation of community dynamics and plant competition abilities. The study sites are located at the South and Centre of Portugal and are characterized by a mesomediterranean climate with different annual precipitation values. In order to obtain an integrative view of the ecophysiological patterns, several methods concerning water relations, photosynthesis and stable isotopes ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) *in situ* and under controlled conditions at different development stages (seedlings, juveniles and adult plants) have been performed. According to the obtained results, in general, the invasive species showed a very high susceptibility to water stress in all age classes, with a marked depression of metabolic activity during the drought season when compared with natural vegetation.



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7th Sept.

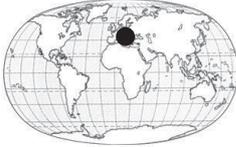
S4:

9.55-10.10

SOIL MICROBIOLOGICAL EFFECTS OF THE INVASIVE SPECIES *ACACIA LONGIFOLIA*

keywords: *Acacia longifolia*, Portugal, soil microbiology

Mediterranean ecosystems are among the most seriously affected by invasive species, with alarming decreases in biodiversity and changes to ecosystem processes. Soil microbial processes respond to the composition of the plant community and vice versa, and consequently it is of particular concern if plant-driven changes in soil processes could create feedback mechanisms that increase the invasibility of a particular species. In the Portuguese dune ecosystems, Sydney golden wattle (*Acacia longifolia* (Andrews) Willd) is one of the most threatening invasive plant species. This species was planted at the beginning of the last century to curb sand erosion but has now proliferated and is causing significant ecological impacts. The present study aims to evaluate some of the effects of this invasive species on soil processes. In the Natural Reserve of São Jacinto Dunes, a coastal dune ecosystem, areas invaded by Sydney golden wattle were compared with areas with native vegetation with respect to several soil microbiological parameters: potential nitrification, substrate induced respiration, basal respiration, B-glucosaminidase activity and active microfungi. Three soil samples were collected in each area, at two different depths: 0 - 10cm and 10 - 20cm. Results show a clear trend to an increase of microbiological activity in the presence of the invasive species. Despite the effect of *A. longifolia* being more pronounced in the upper 10cm, it is still possible to observe its effects at 20cm. Results are discussed considering possible implications for carbon and nitrogen cycling and management options.



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8th Sept.
S7:
13.15-13.30

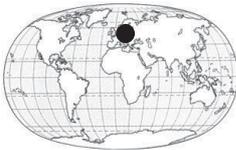
PLANT AND FUNGI INVASIONS IN POLAND

keywords: data bases, research, checklists, Poland

The presented project, financed by the Polish Ministry of Science, engages dozens of specialists from all academic centres in Poland. It covers all most important issues related to plant and fungi invasions. Main aims of the project may be summarised as follows:

1) settling terminology and scope of the notions related to biological invasions (with special regard to the plant and fungi); 2) identification of invasive species in Poland – a critical analysis of invasiveness of all the alien plants and fungi reported from the country to date; 3) attempt to describe the mechanisms and routes of invasions and to assess the rate of the invasive species spreading; 4) characteristics of the present distribution and status as well as the degree of establishment of particular invasive species in the Polish territory; 5) creation of lists of biotopes and landscape units particularly endangered by invasive species (with special regard to the habitats listed in the annex to the Habitat Directive); 6) characterisation of the process of invasion (chiefly with regard to the “most invasive” species); 7) characterisation of the various consequences of the penetration of the alien invasive species into the natural environment of Poland: – specific and intra-specific diversity level (incl. role of hybridization); – biocenotic (habitat) level; – landscape level; 8) assessment of the scale of endangerment of the Polish national parks and other protected areas by invasive species; 9) overview of the economical effects of invasions; 10) proposal of the comprehensive solutions to prevent invasions (law regulations, monitoring and others). Above mentioned issues will be addressed in a monograph dealing with plant and fungi invasions.

Another final result of the project, will be the “Book of invasive species in Poland”, comprising mini-monographs of about 170 species of plants and fungi established in the flora of Poland, and characterised according to the same, accepted scheme.



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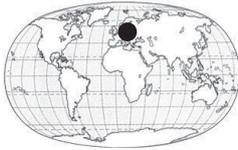


6th Sept.
S1:
12.15-12.30

SOIL SEED BANK DYNAMICS AND SEED BEHAVIOR IN *HERACLEUM MANTEGAZZIANUM*

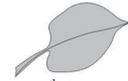
keywords: seed bank, germination, dormancy, longevity

Soil seed bank and seed germination characteristics of *H. mantegazzianum*, native to W Caucasus and invasive in Europe, were studied. For the seed bank study, soil samples were taken in October (after fruit release), March (before germination) and July (before fruit release) in 7 heavily invaded sites in W Bohemia, Czech Republic. Numbers of seed (total, dormant, non-dormant, living, dead) significantly differed among autumn, spring and summer. The proportion of non-dormant seed among living was only 0.3% in autumn, indicating exclusively spring germination. After cold stratification in winter, non-dormant seed contributed 87.5% in spring and after massive germination decreased to 2.9% in summer. Total seed bank, pooled across localities, was 6719-4119 per m² in autumn, 4907-2278 in spring and 1301-1036 in summer. For living seed, it was 3759-2906 in autumn, 2044-1198 in spring, and 192-165 in summer. These results suggest that only 8.5-7.0% of living seeds that were present in autumn can persist in the soil seed bank until the next summer. In a common garden experiment, ca 90% of seeds buried in autumn germinated early in the following spring. About 9% of buried seed survived until the next autumn and less than 3% survived for two years. This, together with 95% seed concentrated in the upper 5 cm soil layer (but some do occur in deeper layers), indicates a short-term persistent seed bank in *H. mantegazzianum* (*sensu* Thompson et al. 1997). Germination experiments showed that at low temperatures seeds germinated better and that it takes longer time to germinate than at higher temperatures. This result, together with the fact that seeds in the field only germinate in spring, suggests that high summer temperatures prevent seed germination later in the season. Seeds that remain dormant buried in the soil seed bank can reappear next spring.



Lindsey NORRGROVE

Institute of Plant Production and Agroecology in the Tropics and SubTropics, University of
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7th Sept.

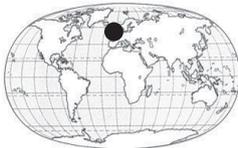
S4:

13.00-13.15

**AGENTS OF DEFORESTATION OR FOREST ADVANCEMENT? IMPACTS OF THE INVADERS,
CHROMOLAENA ODORATA AND *IMPERATA CYLINDRICA* AT THE TROPICAL FOREST -
SAVANNAH BOUNDARY IN CENTRAL CAMEROON**

keywords: *Chromolaena odorata*, *Imperata cylindrica*, humid tropics

In central Cameroon, the landscape is a mosaic of cropped land, fallows and patches of secondary forest. The common discourse is that this area was previously contiguous forest. The discourse continues that grass-dominated areas are a result of increasingly shortening fallow periods in the commonly used slash and burn system and are an indicator of soil degradation. Yet, farmers report that forest cover was less during their youth and that forest colonisation of savannah has occurred, accelerated by cultivation along the forest savannah boundaries, and by the appearance in the 1960s of *Chromolaena odorata*, an exotic shrubby weed, now a dominant fallow type in central Africa. To understand the role of *C. odorata*, a replicated factorial experiment was designed to: 1) assess the weed seed bank of the forest, savannah sides and *C. odorata* dominated fringe of the forest-savannah boundaries; 2) assess the effects of shade level on community composition and, 3) mimic the competition between *C. odorata*, the most aggressive broadleaf and *Imperata cylindrica*, a invasive grass present in the savannah. Three boundaries were selected with three contrasting soils, a sandy soil, a clayey soil and a silty soil. At each boundary, vegetation was assessed and canopy cover estimated in each of the 3 sites: the forest, savannah and the *C. odorata* fringe area. Topsoil from all 3 sites was transported to Mbalmayo and placed in 30-l basins in an area away from seed rain, and subjected to 3 shade treatments (full light, 70 % and 33 % light) and incubation of the rhizomes of *I. cylindrica* and root stocks of *C. odorata* at various proportions. Once a community had developed, all plants were harvested, the species identified, number of individuals of each species, dry mass and leaf area recorded. The importance of the results in explaining competition at such forest-savannah boundaries is discussed.



Bruce OSBORNE, Margherita GIORIA

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6th Sept.

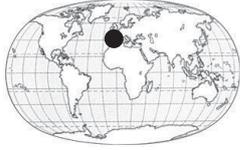
S2:

16.30-16.45

GUNNERA INVASIONS: A GLOBAL PERSPECTIVE

keywords: *Gunnera tinctoria*, climatic links, habitats

Based on current evidence all *Gunnera* invasions globally are restricted to one species, *Gunnera tinctoria* (Molinia) Mirbel. Analysis of these invasions suggests that their history, as well as the habitats occupied by this species today, are broadly comparable across different geographic regions, with a strong climatic dependence. In Britain and Ireland this species was introduced into cultivation around 1850, but was not recorded in the wild until the early 1900 indicating an establishment phase of 60 years. Significant records of this species in the wild were not, however, found until the 1950 indicating a further lag phase of 40 years before any significant spread. This is broadly consistent with pollen analysis and sediment dating using isotopes. The possible reason for these lag and establishment phases will be discussed. The primary impact of *G. tinctoria* on ecosystems appears to be a consequence of shading effects, with the greatest impact on the performance of native grasses. Future projections suggest a significant range extension in response to changes in global climate, particularly rainfall, although the possible role of genetic modifications should not be discounted.



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6th Sept.

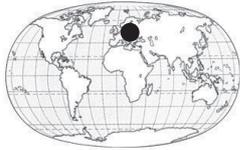
S2:

16.00-16.15

TWO DIFFERENT PATTERNS OF ACACIA SPP. INVASION IN COASTAL DUNE ECOSYSTEMS (PORTUGAL): WITH AND WITHOUT DISTURBANCE

keywords: plant invasion, *Acacia* spp., coastal dunes, facilitation

Alien plant invasion on coastal dunes is a major threat to the indigenous flora and plant communities in Portugal. Coastal dune ecosystems have been identified as susceptible to invasion, due to frequent disturbance and the existence of open spaces, free of plant competition. *Acacia longifolia*, *A. cyclops*, *A. saligna*, native plants from Australia were introduced in the 60s to stabilize sand dunes, and since this time have invaded these ecosystems creating homogenous landscapes and reducing dramatically the biodiversity. It is our aim to understand the invasion pattern of this exotic invasive specie in this type of ecosystem in order to prevent and control further situations. We focused our work in two different localities of Portuguese coast: one in the Centre (Tocha) very disturbed by a fire in 1993; other in the South (Pinheiro da Cruz), here no disturbance occurred since *A. longifolia* was established. In order to obtain the information concerning *Acacia* spp. invasion pattern, remote sensing imagery analysis, field vegetation sampling and seed-bank studies were performed. We identified two different invasion patterns of *Acacia* spp.: One triggered by disturbance (fire) that results in the rapidly increase of the exotic specie after establishment; and another that is triggered under no disturbance, that results in the formation of small invasive clusters below native vegetation, possibly related with facilitation mechanisms between native and invasive plants.



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6th Sept.

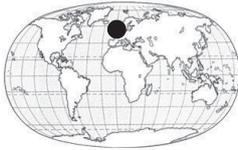
S1:

12.30-12.45

LIFE HISTORY OF A MONOCARPIC INVASIVE SPECIES *HERACLEUM MANTEGAZZIANUM* IN NATIVE AND SECONDARY DISTRIBUTION AREAS

keywords: *Heracleum mantegazzianum*, monocarpy, herbchronology, age structure

Heracleum mantegazzianum is a monocarpic invasive species native to the W Caucasus. In monocarpic species, age of flowering is a crucial aspect of their life history because of the single opportunity to set seed. Although the comparison of an invasive species behaviour in native and secondary distribution areas is important for understanding the principles of plant invasions, it has been rarely used. This study investigated whether there are differences in the age at which plants flower in their native (Caucasus) and introduced (Czech Rep.) range, and how does the age at flowering affect reproductive characteristics. In Caucasus and the Czech Republic, 27 populations of *H. mantegazzianum* were studied in habitats with low (unmanaged) and high (pastures) human impact. Age was estimated by using herbchronology. Region had a marginally significant effect on the age of flowering, with plants from the native range flowering later, which is possibly attributed to a higher altitude in Caucasus. Habitat had a highly significant effect on flowering age; in both regions, plants from pastures flowered later. In unmanaged sites, the median of flowering age was 3 years in the secondary and 4 yr in the native distribution area, while in pastures most plants flower in the fifth year irrespective of region. Maximum age found was 12 years in the Czech Republic. To explore the relationship between the age of flowering and fecundity, seed set of each plant was estimated based on its architecture. Seed set was not related to plant age and no difference between Caucasian and Czech populations was found. These results indicate that there are altitudinal constraints delaying the time of flowering and that in plants on pastures accumulation of resources needed for flowering is delayed by grazing pressure. The timing of flowering appears to be triggered by the amount of accumulated resources, following the same principles in native and secondary distribution ranges.



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8th Sept.

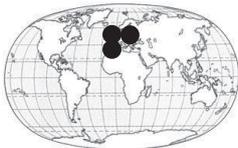
S6:

9.40-9.55

WHO OWNS THE LANDSCAPE? PUBLIC OUTREACH VIA COLLABORATION BETWEEN A PLANT ECOLOGIST AND AN ENVIRONMENTAL ARTIST

keywords: human perceptions, public outreach, art science, collaboration, landscape ownership

We report on a collaborative process between an environmental artist and a plant ecologist working together to produce integrated outcomes that speak to both art and science communities as well as to a wider public audience. The work we have produced in the last two years emphasises the human factor in instigating and sustaining plant invasions. Human perceptions of this role have been challenged and expanded by the work we have produced. Integral to this work is public interaction and evaluation of the public response. Responses have included a surprising strength of feeling about ownership of the landscape in which people live. This approach has extended the alien debate into different communities. Our work is receiving media attention and creating continued discussion amongst environmental organizations. We discuss specific examples of this collaborative process and future development of this work as a way forward in generating debate and awareness around the issue of the human dimension of plant invasions.



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7th Sept.

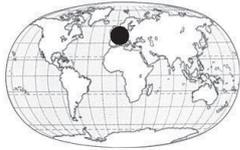
S4:

9.40-9.55

FACTORS AFFECTING NATURALIZATION SUCCESS: A GLOBAL PATTERN

keywords: naturalization, global pattern, transition rate, geography, climate

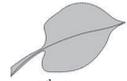
Comparative studies evaluating naturalization of alien plants and animals mostly focus on species biological and ecological traits as determinants of naturalization success. Apart from species traits determining the invasiveness, geographical factors play eminent role; this contribution explores their importance on a global scale. Moreover, most studies are based on numbers of naturalized species in different regions and little has been known about the rate at which species naturalize, i.e. about the transition from casual to naturalization phase of the invasion process. The effect of explanatory variables (latitude, longitude, temperature, precipitation, human population density, islandness) on naturalization rate was studied by using over 300 globally distributed data sets covering both temperate and tropical/subtropical zones. Number of naturalized species and their proportion among all aliens was analysed for plants and compared with results obtained for mammals, birds, fish, herptiles and molluscs. Statistical analysis using maximum adequate models allowed to identify net effects of explanatory variables unbiased by their mutual correlation, and reveal patterns valid regardless of taxa. Naturalization is easier in warmer regions and on islands compared to mainland. On mainland, it increases with available area while on islands, temperature appears to be the most important driver of naturalization. Compared with other taxonomic groups, plants do not differ from birds and fishes in naturalization rate but are less successful than mammals.



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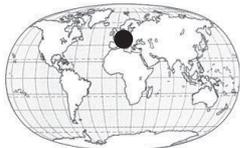
S6:

9.55-10.10

IMPORTANCE OF STOCK EXTERNALITIES IN MANAGEMENT STRATEGIES FOR INVASIVE SPECIES

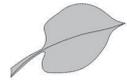
keywords: invasive species, resource economics, eradication, controlled invasion

The management of an invasive species presents some similarities with renewable resources. However, the objective function is the sum of two positive and often increasing components: environmental damages and management costs. The paper stresses the importance of stock externalities to ensure that a non zero stock is optimal. In a static approach, the paper shows that when the damage is decreasing, the absence of stock externalities leads to a solution of eradication (zero stock) under usual assumptions. If the damage is decreasing (and negative as sometimes assumed), it is still possible that a non zero stock to be optimal. In the presence of externalities, it is more likely that an interior solution be optimal, although it needs not to the case. If the stock externalities tend to be infinitely large for low stock levels, then eradication is ruled out. In the dynamic approach, conditions are given for an interior solution to exist. The existence of externalities helps satisfy both first and second conditions for a solutions stopping short from full eradication An empirical application for *Ludwigia* spp. will be given. The aim of this study is to identify and quantify control strategies for various French sites invaded by *Ludwigia* spp.



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6th Sept.

S1:

13.00-13.15

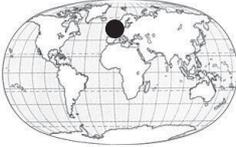
NO EVIDENCE FOR LOCAL ADAPTATION IN AN INVASIVE PLANT

keywords: local adaptation, *Mahonia*, invasive plant

The role of evolutionary adjustments to the new environment is an emerging focus in invasion biology in recent years. Interspecific hybridization may enhance the ability of adaptive evolution because it leads to increased genetic variation and novel genotypes. *Mahonia aquifolium* Pursh. (Nutt.) (Berberidaceae) is a shrub native in North America and invasive in Central Europe. Since its introduction for ornamental reasons in 1822, *M. aquifolium* was crossed by plant breeders with closely related species. Using transplantation experiments in the field and in the greenhouse we tested if invasive *Mahonia* populations differ in their response to habitat conditions and if there is evidence for local genetic adaptation.

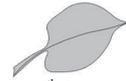
We chose five invasive *Mahonia* populations in Germany representing the range of habitats in which *Mahonia* occurs. We germinated seeds from these populations in the greenhouse and transplanted 10 seedlings from each population in each habitat. Survival after the first summer shows no significant population x habitat interaction. In a second experiment in the greenhouse, we planted seedlings from each of the five populations in each soil, and cultivated them at two watering levels. After four months, plant biomass showed a significant population x watering interaction but no population x soil interaction. To analyze genetic variation within populations, we planted offspring of four seed families from each of three populations in the same five soils as above. There was a significant seed family effect but no seed family x soil interaction.

Our results do not provide any evidence for local adaptation of these populations. In previous experiments, however, we found high genetic variation of several traits within invasive *Mahonia* populations. We suggest that this variation is caused by hybridization and that there has not been sufficient time for local adaptation since the start of the invasion in Central Europe.



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6th Sept.

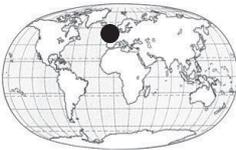
S3:

18.00-18.15

INVASIVE ALIEN PLANT SPECIES OF EUROPEAN ORIGIN IN AUSTRALIA: THEIR IMPORTANCE, EVOLUTION AND MANAGEMENT HISTORY

keywords: weed, exotic plant, biological control, methods of introduction

In the early years after colonisation the alien invasive species that arrived in Australia were dominated by European species associated with a) the origins of colonists and encouragement to bring their plants with them, and b) the rapid installation of agricultural practices of European origin to which many such plant species were highly adapted. With time the domination of the Australian alien flora with species of European origin has diminished as species better adapted to Australian climatic conditions have arrived and become established from other areas of closer proximity and ecological similarity around the world; notably South Africa, Asia and South America and from other tropical regions. Many invasive alien species of European origin have nonetheless been in Australia long enough to have adapted to the Australian environment, following separate evolutionary pathways to their native counterparts in Europe. These will be discussed. The management of weeds of European origin in Australia has a long history dating back to the early 1900. In this paper the history of their management particularly using biological control is documented and their successful management as a group is reviewed.



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8th Sept.

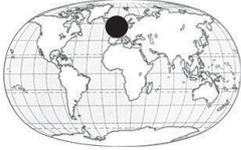
S6:

11.15-11.30-

THE IMPACT OF EUROPEAN LEGISLATION ON THE BIOLOGICAL CONTROL OF WEEDS, WITH PARTICULAR REFERENCE TO THE UK

keywords: biological control, weeds, legislation, regulation

Although European nations are amongst world leaders in the use of biological control agents to control insect pests in protected crops, their application to invasive weeds has so far been largely overlooked, though this is changing. One of the reasons for this delay is the complex and restrictive primary legislation and its interpretation and application by member states. This paper considers the practical use of both classical and inundative biocontrol against invasive weeds. Using the on-going classical biocontrol programme against Japanese knotweed as a case study, the regulatory challenges facing the practitioner are considered. This situation is discussed in the light of widely-used international guidelines and stated policy to reduce pesticide use. The current problems, especially those relating to micro-organisms, are highlighted and some potential solutions are proposed. The conclusion is drawn that many of the applicable regulations were not drafted with classical biocontrol in mind and are likely to continue to hinder the use of this sustainable approach to weed management.



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7th Sept.

S5:

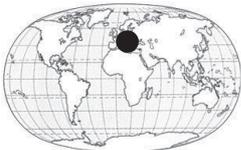
16.30-16.45

MODELLING THE SPATIAL SPREAD OF JAPANESE KNOTWEED (*FALLOPIA JAPONICA*) ON A LOCAL SCALE IN THE UNITED KINGDOM

keywords: *Fallopia japonica*, modelling, rhizome, spread

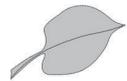
Given the invasive nature of *Fallopia japonica* (Houtt.) Ronse Decraene (syn. *Reynoutria japonica*, *Polygonum cuspidatum*, Japanese Knotweed) in Europe, USA, Canada and New Zealand it is no wonder that it is a major concern of many public and private organisations, land managers and landowners alike. These parties all share a common desire to at least control, if not eradicate the plant and halt its relentless spread. A number of different management strategies have been applied and it is important to ascertain which is most appropriate in a given situation. With this in mind, tools to test the impact and efficiency of these techniques both quickly and cheaply would be extremely useful.

We are developing mathematical models for the spread of *F. japonica* on a local scale, such as a patch of wasteground, a site marked for development, or a stretch of river, which could be used to predict how the existing aerial shoots of *F. japonica* might spread over time. One of our benchmarks will be to reproduce data observed in the field over six year period in Swansea, UK. As a part of this work we have developed a 3D random walk simulation of the subterranean rhizome network of a single stand that utilises data from our fieldwork. We use this simulation to investigate the importance of various parameters in affecting crown density and rates of stand expansion. Here we present some of the relevant fieldwork, the model itself and discuss some of the results of our work.



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8th Sept.

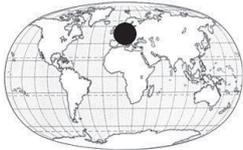
S6:

11.30-11.45

ALIEN PLANT INVASIONS, LMOs AND BIODIVERSITY PROTECTION. INTERNATIONAL, EU AND POLISH LEGAL FRAMEWORK

keywords: legal framework, international cooperation

Effective and efficient coping with the problem of alien plant invasions requires an appropriate action to be taken at the global, regional as well as national levels. Development and implementation of a comprehensive legal framework is an essential prerequisite to deal with the issue of biological invasions as it provides a basis for taking suitable measures to prevent such invasions from occurring and to mitigate its negative impacts. Role of law in this context is important and proper legal regulation should support scientific efforts and developments in this field. The aim of this presentation is to provide a short overview and an analysis of main instruments in existing legal framework (global, European and Polish) on invasive alien plants and on living modified organisms (LMOs – understood as in the Cartagena Protocol on Biosafety) issues. It will point out these aspects of LMOs regulation, which address their potential adverse impacts on the biological diversity and the environment, including their potential invasiveness. Introduction of LMOs into the environment raises many concerns. Appropriate regulation addressing the risks of alien plant invasions and regulation on potential negative effects of LMOs on the receiving environment and biodiversity are linked in many aspects and there exist certain similarities between them, which are intended to be discussed. Regulation on both invasive alien species and LMOs must be based on the precautionary principle due to existing uncertainty concerning many of their impacts on the ecosystems and biological diversity. These issues are addressed in various international forums, governmental as well as non-governmental. The approach of Polish legislator to these subjects is also intended to be outlined.



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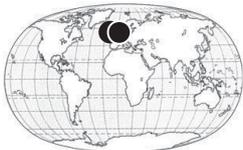


8th Sept.
S6:
10.10-10.25

INTERACTIONS BETWEEN INVASIVE AQUATIC PLANTS AND EXOTIC/ AUTOCHTHONOUS MACROINVERTEBRATES

keywords: native species, alien species, aquatic macrophyte, palatability, *Gammarus pulex*, *Gammarus roeseli*

The lack of enemies in the invaded areas is assumed to play a key role for a successful establishment of exotic species. This hypothesis led to the suggestion that introduced plants are in general less vulnerable than native to phytophagous animals. We assessed this hypothesis in laboratory experiments to test if the spread of an alien plant is promoted by a pressure releasing from (1) native herbivores or (2) from alien herbivores recently introduced in the ecosystem. The results allowed to compare the palatability of invasive aquatic macrophytes (*Egeria densa*, *Elodea nuttallii*, *Myriophyllum aquaticum*), naturalised plant (*Elodea canadensis*), and native plant (*Ceratophyllum demersum*, *Myriophyllum spicatum*) both by autochthonous and exotic macroinvertebrates (*Gammarus pulex* and *G. roeseli* respectively). The two species of *Gammarus* were collected from rivers differing in their nutrient status. The consumption rate of macroinvertebrates was recorded for the six species in one choice experiment and in two non-choice experiments. No differences were obtained between the feeding preferences of the exotic and the native *Gammarus* species for the different plant species tested. The exotic plant species *Egeria densa* and *Myriophyllum aquaticum* were less consumed than the native species (*C. demersum*, *M. spicatum*) and than *Elodea* species. In both experiments, the amount consumed by macroinvertebrates differed significantly between the two *Gammarus* species. The consumption rate by alien herbivores was higher than the consumption by the native macroinvertebrates. Finally, the plant palatability was related with the river nutrient status.

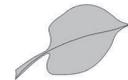


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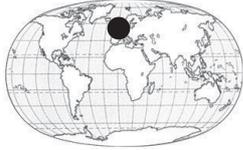


7th Sept.
S5:
16.15-16.30

GENETIC DIVERSITY, CYTOLOGY AND MORPHOLOGY IN THE INVASIVE ALIEN COMPLEX *FALLOPIA* ADANS. (POLYGONACEAE) IN BELGIUM

keywords: *Fallopia*, cytology, morphology, RAPD, PCR-RFLP on cpDNA, flow cytometric analysis

We undertook a morphogenetic and cytological study of the Genus *Fallopia* in Belgium. The objectives were to highlight the morphogenetic variability of clones and to specify the taxonomic relationships between species and hybrids. 139 samples of rhizomes were collected in five regions in Belgium and set in culture. The studied species were *Fallopia* × *conollyana*, *Fallopia japonica*, *Fallopia baldschuanica*, *Fallopia* × *bohemica* and *Fallopia sachalinensis*. The cytological study was undertaken in order to know the chromosomal number of the species and was used as a basis for a flow cytometric analysis for the determination of the DNA ploidy level of a great number of clones. This cytological study was undertaken on roots tips in mitotic division. 13 parental species (5 *F. japonica*, 7 hybrids, 1 *F. sachalinensis*) and 12 seedlings resulting from the germination of the seeds (11 on *F. japonica* and 1 on *F. sachalinensis*) were studied. The results showed that all the clones of *F. japonica* are octoploid'd. *F. sachalinensis* is tetraploid and the hybrids are hexaploid'd. Two shapes of seedlings are observed on *F. japonica*, *Fallopia* × *conollyana* and other seedlings with a variable chromosomal number (2n = 77-110). The flow cytometric analysis was undertaken on 75 clones (32 hybrids, 39 *F. japonica*, 2 *F. sachalinensis*, 2 *F. baldschuanica*). *Fallopia sachalinensis* was the reference clone. The results showed a heterogeneous repartition of cytotypes with a greater dominance of hybrids. The mean ratio individual reference clone was 0,75 for *F. baldschuanica*, 1,6 for hybrids and 2,17 for *F. japonica*. Currently, the genetic study undertaken will highlight the polymorphism at the genetic and genotype level and give the number of introduction to Belgium. The techniques used were of type RAPD, PCR-RFLP on cpDNA. A morphological study will make it possible to differentiate the species thanks to measurement from features on a series of individuals.



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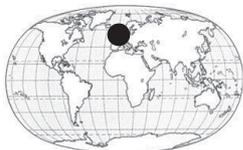


7th Sept.
S4:
11.45-12.00

SEASONAL DYNAMICS OF THE COLONIZATION OF *ELODEA* SPECIES IN RUNNING WATERS OF THE ALSACE RHINE FLOODPLAIN

keywords: *Elodea*, invasion, connexion, trophy level, colonization

Two examples of the American genus *Elodea*, *E. canadensis* L. C. Richard in Michaux Fil., and *E. nuttallii* St John, have spread into the European continent during the last 150 years. The most recent invader, *E. nuttallii*, often replaced the original invader, *E. canadensis*, especially in nutrient-rich sites. The aim of this paper is to analyse the rate of colonization and identify the ecological factors, which favour the development of the two *Elodea* species in running waters. Multivariate data analyses PCA and FCA are employed to show the progression of *Elodea* in the community during a vegetative season from March to October and to identify the discriminate ecological parameters of the development of these species. The colonization was compared over two years 2004-2005 in 11 sites with different degrees of connection to the river Rhine. Parameters tested are chemical ones such as trophy level, electrical conductivity, pH and physical parameters such as light, depth, sediment texture, current velocity and turbidity. The aquatic vegetation was surveyed using percentage of cover in three 2m wide plots per site, crossing the channel. *Elodea nuttallii* dominated in the more recently connected sites, which are fed by the eutrophic Rhine waters whereas *E. canadensis* is located more in mesotrophic watercourses still fed by groundwater. The most discriminating parameter is ammonia nitrogen. In some sites where *E. nuttallii* was abundant, the species grows without any control of the other species. However, in most sites there was no extended colonization over the study period 2004. The main parameter, which seems to control the colonization by *Elodea nuttallii*, is the connection to the river, but the fine substrate, a medium current velocity and a high light intensity seemed to favour the colonization of study sites.



Max WADE

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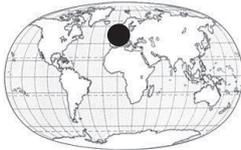


8th Sept.
S6:
10.25-10.40

A REVIEW OF DETAILED STUDIES OF *HERACLEUM MANTEGAZZIANUM*: WHAT LESSONS CAN BE LEARNED IN DEVELOPING STRATEGIES FOR OTHER ALIEN INVASIVE SPECIES?

keywords: Giant Hogweed, invasive weeds, control strategies, biological control, dispersal

Heracleum mantegazzianum has been the focus of a 40 month in depth study by eight research groups across Europe, one of the most detailed studies undertaken in Europe of a non-agricultural weed. Lessons learned from this research are linked to investigations of other alien invasive species and their management. The value of understanding the ecology of the species in its native range is considered and an emphasis is placed on the importance exploring the genetics and taxonomy of the taxon found, in the case of this species, to be more complicated than first imagined. The initial dispersal of *H. mantegazzianum* across Europe relied on different mechanisms from those of latter stages in the invasion at different spatial scales, i.e. invasion into a country or region of similar size, is typically by different modes from the spread of the species from one part of a country to another. *H. mantegazzianum* is reliant on its seeds for propagation and spread, highlighting the importance of the longevity of the seed bank in deciding on effective management, contrasting with other species that are reliant on vegetative reproduction. To date, the search for a suitable biological control agent has been unsuccessful, a quest thwarted by closely related indigenous species (e.g. *H. sphondylium*) and crop species (e.g. *Pastinaca sativa*), and the absence of any identifiable weak point in the plant's life cycle. These findings are discussed in relation to other alien invasive species.



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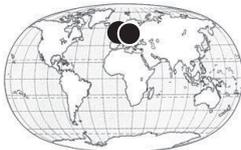


8th Sept.
S6:
11.45-12.00

STRATEGIES FOR THE USE OF PLANT PATHOGENS IN INVASIVE WEED MANAGEMENT

keywords: agent selection, biological control, plant pathology, risk assessment, weeds

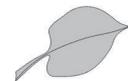
There is an increasing concern with the use of chemical herbicides on their impact on human health and the environment. Herbicide use in nonagricultural fields such as pastures, natural areas, and recreational sites is problematic because of the lack of economic return, the inaccessibility of some sites, and the vast amounts of infested land. For these reasons, plant pathogens are being considered as a weed management option. Depending upon the nature of the target weed, different strategies are followed. Two important factors are knowing what plant stage to target for the most effective results and what agents are already available. The search for a specific type of pathogen can depend upon these factors. Another factor to consider is the habitat of the invasive weed. An airborne pathogen that is highly specific may be preferred to manage weeds that invade expansive natural areas with difficult access. In contrast, weeds that invade disturbed or isolated areas may be effectively controlled in an inundative approach with a more general pathogen that does not spread so easily. Finally, formulation of a stable, effective agent is essential to a biocontrol program with pathogens. Often pathogens effective in greenhouse tests lose their efficacy when applied in the field. In-depth studies have been conducted to find formulations that will maintain effectiveness under natural conditions, primarily in terms of reducing natural dew periods and improving long term storage of the pathogen. Despite the perception that pathogens are unsafe for release as biocontrol agents, the contrary has been demonstrated when specific guidelines are followed and relevant studies of pathogens on agronomic crops are considered. These guidelines include conducting host range studies where the risks and benefits can be analyzed and evaluating the likelihood of the pathogen changing hosts. Although pathogen mutations do occur, this has never been proven in nature to impact host shifts.



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7th Sept.
S4:
11.30-11.45

BIOTIC (FLORISTIC) AND ABIOTIC CONDITIONS ASSOCIATED WITH *SOLIDAGO CANADENSIS* OCCURRENCE ON POST-INDUSTRIAL SITES (COAL MINE SEDIMENTATION POOLS) (UPPER SILESIA, POLAND)

keywords: *Solidago*, spontaneous vegetation, post-industrial sites, Upper Silesia

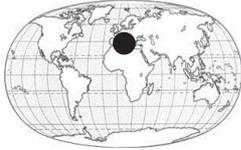
Syntaxonomically *Solidago canadensis* is considered as diagnostic species for the Ass. *Rudbeckio-Solidaginetum* R.Tx. et Raabe 1950 (*Artemisietea vulgaris* class). Its phytocoenoses are recorded along wide rivers valleys (e.g. the Vistula river). However, *S. canadensis* is even more widespread in many ruderal habitats (abandoned arable lands and abandoned meadows) in Poland and it has also been recorded on post-industrial sites.

This paper presents a study of the occurrence of this alien species on coalmine sedimentation pools in Upper Silesia. Sedimentation pools consist of a very specific kind of substrate. The plants established there grow on coal dust of high mineral content. Floristic data were collected using Braun-Blanquet methodology from stands where *Solidago canadensis* occurred with a cover abundance of 10% or more. Substratum samples were taken for chemical analysis and other environmental data were also recorded. The types of vegetation in which *S. canadensis* occurs and its most constant associated species are described. Relationships between *S. canadensis* vegetation, environmental features and substratum characteristics are examined using multivariate analysis. Comparisons are made between situations on coalmine sedimentation pools where *S. canadensis* occurs and does not occur.

The analysis of the vegetation samples showed that *S. canadensis* co-occurs along with species typical for meadow of *Molinio-Arrhenetheretea*, ruderal plants of *Artemisietea vulgaris* and some species of *Stellarietea mediae* class. There are some phytocoenoses that are dominated exclusively or co-dominated by *S. canadensis*.

POSTERS

in alphabetical order



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M 22



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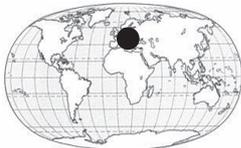
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ALIEN VERSUS NATIVE SPECIES ON COASTAL DUNES IN CENTRAL ITALY. PLANT DISTRIBUTION AND TRAITS

keywords: coastal ecosystems, coastal aliens, functional classification, Mediterranean, plant functional types

This study is part of a project searching for general mechanistic patterns of plant invasions in Mediterranean coastal sand dunes ecosystems. In this work we propose a vascular flora census and a comparative study of plant traits (for alien and native species) between the Italian Tyrrhenian and Adriatic coast. We test the hypothesis that alien invasive species from Mediterranean sand dunes share common biological traits across different environmental conditions. In each site the vascular flora sampling was carried out using the approach of European Cartographic Project. List of vascular plants, information about life forms, chorotypes, physical environment and disturbance were stored in a data-bank. Most common native and alien species (among them naturalized and actual and potential invaders) were selected. In order to perform a functional classification, we focused on the characterization of plant traits based both on measured and on published information. Morphological traits (plant height, plant growth form, leaf surface and leaf consistency) and regeneration traits (seed mass, dispersal mode, phenology (onset of flowering) and clonality or resprouting ability) were considered. Functional groups were determined using multivariate analyses. At present, more than 650 species of vascular plants were registered on sand dunes of Central Italy, with 86 taxonomic families. Among these species, 50 were considered aliens. The comparative analyses of plant traits showed different functional groups among aliens species and also different distribution patterns between the Tyrrhenian and the Adriatic coast.



Artur ADAMCZAK

M 15

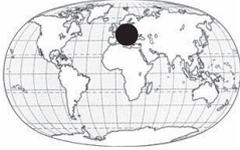


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ANTHROPOPHYTES IN SECONDARY THICKETS AND WOODS ON SYNANTHROPIC HABITATS OF POZNAŃ AND ITS VICINITY

keywords: anthropophytes, thickets, woods, synanthropic habitats

This paper is a part of a larger project concerning the phenomenon of encroachment of trees and shrubs on synanthropic habitats after the cessation of direct human impact. The city of Poznań and its surroundings give great opportunity to study this process. The aim of this study was to describe the participation of anthropophytes in secondary thickets and young woods. Particular attention was paid to the alien shrub and tree species. An attempt was made to determine exactly in which way the share of anthropophytes in phytocoenoses depends on: 1) type of man-made habitat, 2) time since the abandonment of anthropopressure, 3) the density of trees and shrubs, 4) parameters describing indirectly age of thickets and woods (diameter and height of shrubs and trees). Field investigations were carried out in the years 2002-2004. In the analysis 499 phytosociological relevés (made according to the Braun-Blanquet approach) were used. The studies were carried out in the potential habitats of oak-hornbeam and ash-elm forests. All the documented thickets and woods are spontaneously-developing communities. Such phytocoenoses are not a relict forest communities or forest degeneration and regeneration stages. The author noted 86 alien species. They constitute 37% of the spontaneous flora of vascular plants of studied thickets and woods. Metaphytes made up 30% of all species (archeophytes: 17%, kenophytes: 13%) and diaphytes - 7%. The greatest percentage of archeophytes was discovered in patches occurring around steel towers supporting electric lines on fields (23%), kenophytes and diaphytes – in thickets and woods in the area of abandoned gardens (19% and 13% respectively). Species of foreign origin made 46% (26 taxa) of tree and shrub species, among them only *Acer negundo* and *Robinia pseudacacia* were observed with a high constancy and cover.



Wojciech ADAMOWSKI

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M 28

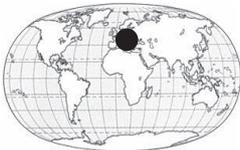


THE APPLE TREE SAVANNAH – AN ALTERNATIVE PATHWAY OF SECONDARY SUCCESSION ON ABANDONED MEADOWS IN THE BIALOWIEZA FOREST

keywords: *Malus domestica*, secondary succession

Malus domestica Borkh. (apple tree) is one of the most widespread representatives of alien tree species in the Białowieża Forest. It is most successful on unused meadows or abandoned fields temporarily used as pastures. In such conditions the tree often dominates reaching over 90% of all trees, and a density of more than 500 individuals per ha. In 10 to 15 years after abandonment, the trees grow in loose clusters (10-50% of cover) over significant areas of even a few hectares, in a way resembling the physiognomy of savannah vegetation. The apple trees are often accompanied by wild pear *Pyrus pyraster*, less frequently by myrobalan plum *Prunus cerasifera*, while the contribution of pioneer tree species (*Betula*, *Salix*, *Populus*) and permanent species of deciduous forests (*Quercus*, *Carpinus*, *Tilia*, *Acer*) is very low.

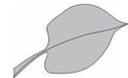
It seems that the appearance of the apple tree savannah is a consequence of a significant spreading of apple tree cultivation, the presence of mammals dispersing the seeds over large areas and a series of mild winters in the 1980s and 1990s, limiting the losses due to winter foraging of hares and the deer family.



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M 30

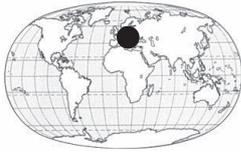


BALSAMS IN ACTION

keywords: *Impatiens*, invasion, prediction

The genus *Impatiens* includes a number of species with very attractive flowers. Some of them were introduced in cultivation already in the 19th century. At least two taxa have become one of the most popular decorative plants in the world. The hitherto introductions of balsams have resulted in a few spectacular expansions e.g. of *Impatiens glandulifera*, *I. parviflora*, *I. capensis*, *I. balfouri*, *I. walleriana*, etc. Because of the recent interest in the genus as a source of potential decorative plants and cultivation of many new taxa, a study was undertaken to analyse the threat of appearance of other possibly invasive balsam species.

In the conditions of the temperate climatic zone, greater chances of wide spreading have the taxa originating from the mountainous areas in the Himalaya and in China (79 from the 220 balsam species known from China grow above 3000 m a.s.l.). The regions are characterised by well marked climatic seasons. Over 80% of the balsam species growing in these areas are annuals wintering in seeds. The balsams coming from tropical Africa are mostly perennials – in over 90% - adapted to more harmonious course of meteorological phenomena. They can expand in the intertropical zone characterised by abundant precipitations.



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M 29

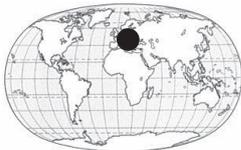


ORNAMENTAL GROWING WILD IN THE BIALOWIEŻA FOREST REGION

keywords: ornamental plants, naturalisation, prediction

Over the last 15 years numerous decorative plants have been introduced in cultivation. Some of them have spread over post-agricultural land and taken part in secondary succession. The study has been undertaken to document the present state of naturalisation of decorative herbal plants in the region of the Białowieża Forest and make predictions as to their further fate. Hitherto, at least 67 species from this group have been noted outside the places of cultivation and 50 species of this group occupied exclusively anthropogenically changed habitats (ruderal areas, road shoulders, fence adjoining grounds, etc.), 10 appeared also in abandoned farmlands and only 9 revealed a tendency of spreading into natural vegetation communities.

The strongest spreading tendencies have been noted for *Lupinus polyphyllus*, *Solidago gigantea* and *Echinocystis lobata*. *Impatiens glandulifera*, known for its invasive character observed in many European countries, has not been much successful in the Białowieża Forest, although is noted at a few sites in the river rushes. A very interesting phenomenon is the escape from cultivation of *Matteucia struthiopteris*, the species under protection in Poland and whose presence in the Białowieża Forest is outside of its natural range.

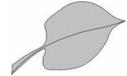


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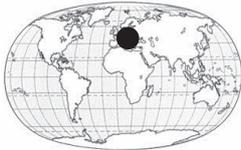
M 12



PATTERNS OF INVASION OF FOUR AMERICAN TREES IN THE KAMPINOSKI NATIONAL PARK, POLAND

keywords: trees forest succession spread

We studied the distribution of four invasive American trees: *Acer negundo* L. (boxelder), *Quercus rubra* L. (red oak), *Robinia pseudoacacia* L. (black locust) and *Prunus serotina* Erh. (the black cherry) in the tree stands on the Eastern border of the Kampinoski National Park, in the vicinity of the Warsaw. We hypothesised that they colonise all forest stands at an equal rate, i.e. the abundance, the size structure and the spatial distribution of their populations would not differ in the tree stands of different properties. We counted individuals (or black locust ramets) belonging to the four height classes in a grid composed of 6370 37x 42m plot set up in the forest using the GPS. The properties of the tree stands (habitat type, potential vegetation, cover, mean height, DBH, volume and age of every tree canopy species) were taken from the databases of the Kampinoski National Park GIS. Our results indicate that all 4 species do not differ too much in their preference to the soil or potential vegetation properties. The red oak abundance was correlated with the greatest number of parameters of the canopy, while black cherry and the black locust were correlated with lower number of parameters. The greatest difference was found in the pattern of spatial distribution - the boxelder was mostly limited to the forest border and occurred only sporadically within forest, while the red oak and the black cherry were the most abundant species in the forest. Additionally, the red oak was most distantly spread in the forest from its initial stands. We concluded that dispersal capabilities together with competing canopy species composition may be more important determinants of the invasibility of the forest complexes by four studied species, than the abiotic conditions of the soil and habitat.



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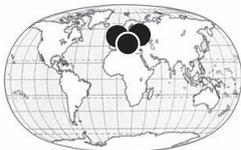
A 11



RUMEX ALPINUS L. IN KARKONOSZE (THE SUDETEN MOUNTAINS) APOPHYTE OR ANTROPOPHYTE?

keywords: *Rumex alpinus*, Karkonosze Mountains, apophyte, antropophyte

Human activity is one of the basic factors that decide about the character and directions of changes of floras of various regions of the country. Some plant species lose many of their stations and their range decreases. On the other hand – some spread and appear in synantropic communities where they were not recorded earlier. In case of this second group of plants very often it is difficult to ascertain their initial ranges. *Rumex alpinus* is such a problematic taxon. The species is characterized enabling intensive expansion in places significantly transformed by man. Primarily, it is a highly nitrophilous plant, showing strong demands with respect to light and humid conditions. Due to well developed rhizome it reproduces vegetatively very well. It also produces many seeds which keep the ability to germinate for many years. All the above characters enable expansion of the species which in favorable conditions forms dense groups (ass. *Rumicetum alpini*). Within the area of the Karkonosze National Park the discussed species can be included to a group of the most expansive plants. In majority, sources describe *R. alpinus* as a plant native to the Sudeten Mountains. Nevertheless, numerous factors justify the statement that the species is an alien plant, at least within the area of the Karkonosze Ridge, where it has numerous stations. All stations, however are associated with places of human activity such as: vicinities of huts, bygone settlements, roadsides and tourist trails. Until now the plant has not been recorded in natural plant communities (of the *Betulo-Adenostyletea* class). It declines in places where human activity ceased. Furthermore, the species is especially characteristic of the subalpine belt. In the Karkonosze Ridge most stations are located within the lower plant belts. Hence, numerous factors prove that *R. alpinus* should be considered an alien plant (antropophyte) and not a native one (apophyte) to this highest ridge of the Sudeten Mountains.



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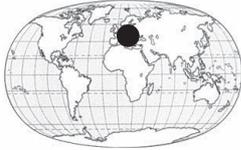
PSYLLIODES SP. NR. CHALCOMERUS AND CERATAPION BASICORNE: SYNERGISM OF MORPHOLOGICAL OBSERVATIONS, LIFE HISTORY, HOST RANGE AND GENETIC ANALYSES FOR THE SELECTION AS CANDIDATES FOR THE BIOLOGICAL CONTROL OF CENTAUREA SOLSTITIALIS L.

keywords: biocontrol, yellow starthistle, *Ceratapion*, *Psylliodes*

Centaurea solstitialis L. (Asteraceae) is an alien weed introduced at the end of 1800 in the Western United States. Today, with an infestation area of more than 9 million acres, is considered one of the most economically important weeds in California.

A biological control program was started in the middle of 1900, and 5 seed feeder insects of Eurasian origin have been released. Despite the annual biology of the plant and the high infestation rates recorded in the flower heads of the target weed for most of the species released, only recently occasional decline of the weed population density was observed. For this reason, starting from 2000 more effort has been put in the search, selection and evaluation of biocontrol candidates attacking *C. solstitialis* at the root and/or stem level at early phenological stages. Among them, high priority has been given to the crown boring weevil *Ceratapion basicorne* and the stem boring flea beetle *Psylliodes* sp. nr. *chalconeris*. Both beetles have been found in Eastern Europe, are univoltine, attack the weed at the rosette or early bolting stage and showed relevant impact when several larvae are found in a single plant. The presence of sibling or closely related species was recorded in sympatric conditions for both insects.

This work describes the importance to combine the classical approach (biological observations and host range tests) with genetic analyses as an important tool for the successful discrimination of the target insect species.



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A 10



***BROMUS ERECTUS* HUDS. – AN ALIEN INVASIVE SPECIES OR NATIVE SPECIES FOR THE SILESIAN UPLAND AREA (SOUTHERN POLAND)?**

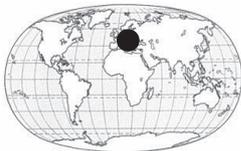
keywords: grass, domination, species spreading, Silesian Upland

Bromus erectus is considered to be a probable anthropophyte in the area of Poland but some botanists suggest that it can have a native character in some of western and southern regions of the country (Zajac A., Zajac M. 2001). This grass is not a very frequent species in the Silesian Upland, however its localities are distributed rather evenly. The occurrence of *B. erectus* is usually correlated there with the presence of calcareous rocks, and mainly Triassic ones.

The most of *B. erectus* localities in the Silesian Upland area have been noted during the last 20-30 years. However, the older data are not numerous, even on the areas where the floristic investigations were carried out intensively at the turn of the 19th and 20th centuries (Fiek 1881, Schube 1903). Those two facts could suggest that this grass has spread in the area of the Upland during the last decades.

In the Silesian Upland *B. erectus* was most frequently noted in the disturbed xerothermic grasslands and in the grassland-like communities. It usually grows in sodded excavations and in their close neighbourhood, also in “warpie”-called excavations and roadside escarpments. The discussed grass sometimes forms almost single-species aggregations there.

The arguments for the affiliation of *B. erectus* to the group of anthropophytes in the Silesian Upland area are the following: (1) the great number of relatively new localities, (2) the connection with the synanthropic or strongly disturbed seminatural habitats and (3) its very distinct domination on the majority of localities.



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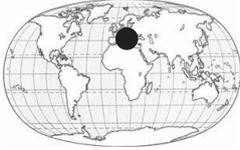
A 7



JAPANESE HOP (*HUMULUS JAPONICUS*), A LESS-KNOWN INVASIVE ECOLOGICAL WEED IN HUNGARY

keywords: *Humulus japonicus*, ecological weed, Hungary

The Japanese hop (*Humulus japonicus* Sieb. et Zucc., syn. *H. scandens* /Lour./ Merrill) is native to East Asia, primarily in the deciduous forest zone of Japan, China, Korea, Russian Far East and the neighbouring islands. It is a rambling or climbing, fast-growing herbaceous vine, a hapaxanth, dioecious, wind pollinated species. Since it has no lupulin glands, it has nearly no economical value in contrast with the common hop (*H. lupulus* L.); on the contrary, it is a pollen allergenic plant. It was brought to Europe and North America as an annual ornamental (incl. f. *variegatum* Sieb. et Zucc.). The plant easily growing wild, sowing itself. In its native area this plant also occurs as weed especially along roads and in ruderal habitats. In North America it is an introduced species occurring from the eastern coast to the centre of the continent. It is planted in the European gardens since 1886. Since then, several countries reported it as a casual alien, but its naturalisation is known only from N-Italy, Hungary and Slovenia today. The Japanese hop in Great Britain, Germany, Czech Republic, Austria, Romania and Ukraine is a casual neophyte till now. It spreads in Hungary since 1894 in a slow but continuous manner. As a garden escapee it occurs in ruderal habitats as well, however it is predominantly spread by water streams, like a typical riparian migrant. At the same time *H. japonicus* is an invasive plant endangering the vegetation along rivers and brooks. Even the stronger herbs' shoots bend under the load of its thick, heavy and shady mesh. It is often forms dense carpets on bare alluvial banks, beneath of which only a few or no any other species occurs. The Japanese hop draws the attention to itself as a dangerous ecological weed in Hungary. Present work summarizes the knowledge on this species according to the local field surveys and the accessible literature on the subject.



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A 42

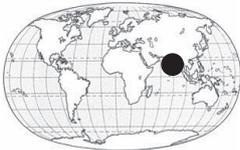


SPREAD AND OCCURRENCE OF JAPANESE KNOTWEED (*FALLOPIA JAPONICA*) IN PIEDMONT (NW-ITALY): TRANSALPINE INVASION

keywords: *Fallopia japonica*, Piedmont, distribution, genetic diversity

Occurrence of *Fallopia japonica* (Houtt.) Ronse Decraene in Piedmont as well as in northern Italy has been underestimated in the European context up to now. Since few decades after its introduction to Italy in the middle of 19th century as cultivated plant, *F. japonica* has spread widely in particular in Piedmont in ruderal areas, along river and roadsides and up to about 1000m (maximum altitude 1500m) in alpine valleys.

Actual distribution of the species in Piedmont is reported from herbarium specimens (TO-HP), bibliographical data and field surveys. The use of GIS allowed to map the spread in time and space of the species. The distribution data have been related to environmental factors: climate, altitude, human impact and habitat to highlight the plant behaviour close to the southern boundary of its range. A correct identification of collected samples has been made on the basis of morphological differences and chromosome numbers in order to distinguish among *F. japonica*, its relatives and hybrids. The role of both vegetative and generative reproduction and hybridisation in the spread of these taxa in Piedmont have been focused analysing both the genetic structure of *F. japonica* populations and the occurrence of seed production.



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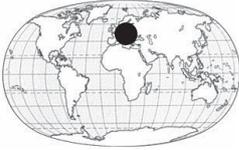
M 35-1



CURRENT DISTRIBUTION, STATUS OF *LANTANA CAMARA* L. (VERBENACEAE) AND BIOCONTROL POTENTIAL OF PHYTOPHAGOUS INSECTS RECORDED ON IT IN JAMMU, (J&K), INDIA

keywords: *Lantana camara*, distribution, phytophagous insects, biocontrol potential

Lantana camara L. (Verbenaceae) is a pantropical weed affecting pastures and native forests in over 60 countries worldwide. It is considered a significant problem weed in many of the countries to which it has been introduced and has been focus of biological control attempts for long but yet still pose major problems in many regions of the world including India. *Lantana* pose serious problem in two districts of Jammu while low to medium infestations have been observed in other parts of the region. This weed has considerable impact on economic and environmental areas. Survey of phytophagous insects associated with *Lantana* in Jammu yielded nine species from four orders. Of these, *Telonema scrupulosa* (Hemiptera: Tingidae), *Hypena laceratalis* (Lepidoptera: Noctuidae) and *Ophiomyia lantanae* (Diptera: Agromyzidae) has shown potential in suppressing this weed. The present paper records current distribution and status of *Lantana camara* in Jammu and biocontrol potential of the insects recorded on it has been discussed.



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Vácrátót, Hungary

M 27

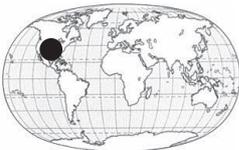


UNSATURATED GUILDS, UNEXPLOITED RESOURCES AND PLANT INVASION

keywords: unexploited resources, species pool, floodplain

This study examines the role of unsaturated guilds and unexploited resources in the invasibility of plant communities. Due to the limited available species pool, there may be unsaturated guilds, which have not used up the all available resources. According to our hypothesis these unexploited resources facilitate the invasion of alien species belonging to these guilds. If this hypothesis is true, these invaders not only replace the native species, but can increase the abundance of their guilds by the utilisation of the unexploited resources.

We examined in the floodplains of the Carpathian Basin whether the cover of different guilds is higher in the case of presence of invasive species. According to our results the invasive species belonging to the tall forb and in a smaller extent to the annual dicots increase the abundance of their guilds. In our opinion, these guilds were unsaturated before invasion and this unsaturatedness explain the success of invasive species belonging to them.



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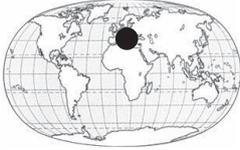
M 38



ECOLOGY AND MANAGEMENT OF *ALHAGI MAURORUM* MEDIK. (CAMELTHORN) IN ARIZONA, USA

keywords: invasive, competitive, mortality, camelthorn, herbicides

Plant invasions are symptom of global environmental change. *Alhagi maurorum* Medik. is a native of the Middle East, southeastern Russia, and northern Africa. *A. maurorum* is a member of the Fabaceae family. *A. maurorum* is perennial, semi-woody, with highly branched glabrous stems, small entire leaves, and spines 2 cm in length. *A. maurorum* flowers in mid summer and produces 3 to 5 seeds per fruit, it can also vegetatively reproduce from deep rootstalks. *A. maurorum* was introduced to the United States in about 1900 as wrapping material of date palm *Phoenix dactylifera* L. offshoots and in alfalfa *Medicago sativa* L. seed. *A. maurorum* is locally abundant in the southwestern United States especially along the Little Colorado River in northeastern Arizona. It is competitive with native vegetation and is grazed lightly by domestic livestock. In 1999 stands of *A. maurorum* were found at an elevation of 2070 m in a forest of *Pinus ponderosa* Lawson and *Quercus gambelii* Nutt. in northcentral Arizona. The plants were along road right-of-ways and presumed to be introduced in the construction material for the roads approximately 15 years earlier. A total of 40 stands were found containing 4,468 plant crowns, ranging from 40 cm to 1 m height. *A. maurorum* is difficult to control. Pulling, fire and mechanical treatments result in numerous resprouts, and there are no known biological control agents. Selected herbicides can control *A. maurorum*. Selective, systemic herbicides were applied in mid summer, beginning in 2000 and have been applied to re-emerging crowns annually. Initial mortality from herbicide treatments averaged 84% and in 2004, crown mortality had increased to an average of 98.7%, with little damage to native species.



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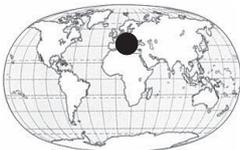
A 30



THE INVENTORY OF THE ITALIAN ALIEN FLORA. STATE OF THE PROJECT

keywords: alien flora, Mediterranean region

The development of databases of alien species is a fundamental first step in the study of biological invasions. Although political boundaries are not an ideal framework for compiling alien floras, the importance of national inventories is becoming increasingly recognised and management-oriented. Moreover, the historical, economic and political aspects of plant invasions related to human activities may be positively addressed at a national and subnational level, especially in the Mediterranean region. Consequently, a project aimed at compiling a catalogue of the alien flora of Italy is in progress, which will report on the current state of non-native flora and establish a basis for future research on plant invasion in the country. Botanists, plant ecologists, phytosociologists and local experts from each of the Italian administrative regions are participating in the project. Data from Herbaria, literature and oriented field surveys are used in order to: (a) compile a comprehensive check-list of the alien vascular plant species occurring outside cultivation in Italian national territory; (b) evaluate the immigration status of each species, i.e. whether casual, naturalized or invasive; (c) record habitat type, *syntaxa* and ecological region (bioclimate, geomorphology and land use) in which the species occur; (d) record the distribution and frequency in each of the Italian administrative regions; (e) collect basic background information on each species, such as origin; year of first introduction into the country; residence time (i.e. whether archaeophyte or neophyte); life form; phenology. The aims of this paper are to: (a) highlight the increasing importance of alien floras compiled at a national level; (b) present the details of the project for the catalogue of the alien flora of Italy; (c) discuss the first results of the project.



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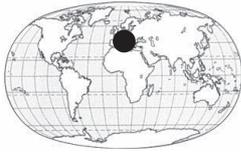
A 31



THE EXOTIC FLORA OF CHAD. UPDATING THE CHECKLIST

keywords: Chad, alien flora

Scientific researches and actions to prevent and mitigate the effects of invasive alien species have been focused largely within developed countries. But some of the most obvious and severe impact of alien plants occur in Africa. Sensitive wetland ecosystems are threatened by a significant contingent of IAS, forming thick mats on water bodies, reducing light and oxygen, affecting biodiversity, fishing and navigation. Thus, IAS are posing a serious threat to biodiversity and associated economic activity in Africa and under current trends, it is likely that the situation will deteriorate. One of the most important pathways of introduction was and is intentional. Many invasive tree species have been introduced because of their potential multi-purpose uses and benefits, e.g. around Lake Chad (in Nigeria and Chad), but while they have indeed provided some benefits, the unanticipated costs may often turn out to be greater. Accidental introduction of aliens is also likely to increase, in agricultural and urban areas, along roads. Trade is now fuelling the development. Thus, there are good reasons why the opportunities for alien species to enter Africa can be expected to increase. In fact, it might be desirable that the opportunities do increase, since they signify and are usually associated with economic development. The first checklist of the exotic flora of Chad was produced by the authors after field surveys from 1999 to 2003 in southern BET (Borkou-Ennedi-Tibesti), Kanem, Lake Fitri, Batha, Biltine, Ouaddai, Lake Chad, Chari-Baguirmi, Guéra, Salamat, Mayo-Kébbi, for more than 12,000 km of track, collecting 1,000 exsiccata and recording more than 3,000 GPS waypoints. During 2004 the North-east region of the country (from N'Djamena to salt lakes in southern Tibesti) was surveyed and examination of herbarium material in N'Djamena and in European herbaria was achieved. We therefore present an updated checklist of the exotic flora of this poorly studied African country.



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A 32



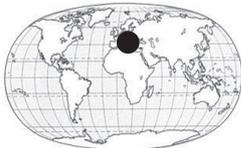
THE INVENTORY OF THE EXOTIC FLORA OF SARDINIA (ITALY)

keywords: alien flora, mediterranean region

The first checklist of the alien flora of the island of Sardinia (Italy), was completed in the beginning of 2000 by the Dept. of Botany and Plant Ecology of the University of Sassari. The project was founded by the Nature Conservation Service of the Italian Ministry of the Environment. This first catalogue and the accompanying geodatabase have been updated in the following years and so far, in the framework of the EU funded project EPIDEMIE (5th FP) and by mean of other research projects dealing with Sardinian exotic flora.

Sardinian plant aliodiversity was largely underestimated by the previous existing studies, mainly based on bibliographic records and herbarium samples, and ranged from 70 (Weber, J. Veg. Sci., 8: 565-572, 1997) to 184 species (with 160 naturalized species (according to Viegi, Boll. Soc. Sarda Sci. Nat., 29: 116-234, 1993).

The check-list produced and regularly updated should be the more comprehensive inventory actually available (1.200 taxa). It has been compiled using historical data (e.g. local floras, bibliographic records, herbarium exsiccata, *index seminum* etc.) and oriented field GPS surveys and collections. The total number includes all alien species ever recorded or surveyed in the territory of the Region, including most commonly cultivated species (e.g. in garden centres, forest nurseries, botanical gardens) and ephemeral species. The mapping part of the projects addresses the distribution of only a selected set of 110 alien species (naturalised and/or invasive *sensu* Richardson et al., 2000 and Pyšek et al., 2004), according to a grid of 310 cells (10 x 10 km), covering all the Sardinian territory.



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M 26

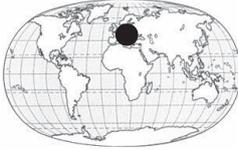


ECOLOGY AND DISTRIBUTION OF *OXALIS PES-CAPRAE* L. IN SARDINIA (ITALY)

keywords: *Oxalis pes-caprae*, GIS modeling, GLM, Mediterranean islands

Oxalis pes-caprae L. is a geophyte accidentally introduced from South Africa that has invaded many Mediterranean regions of the world, including Sardinia, since the beginning of the nineteenth century. In the Mediterranean Basin, it is mostly present in disturbed areas such as olive groves, orchards, vineyards, annual crops, home gardens and roadsides. It also may be present in pastures, especially on limestones and alluvial soils. This is one of the main potential impacts of this alien, because *O. pes-caprae* aboveground biomass contains oxalic acid, which is toxic to livestock when consumed in large quantities, i.e. when other forages are locally scarce. *O. pes-caprae* spreads vegetatively by means of underground bulbs and, so far, no sexual reproduction has been observed in the introduced range.

We have mapped *O. pes-caprae* distribution in Sardinia with GPS field survey recording ca. 1,800 presence sites (presence and local abundance) and ca. 2,100 absence sites. Environmental descriptors and anthropisation indices were both collected in the field and derived from GIS layers. Logistic and autologistic regression (SAS, R) were performed to assess relationships between distribution and predictors. General linear models (SAS) were applied to assess relationships between local abundance of the species and predictors. Raster modeling techniques were tested to predict potential range expansion on the island. Preliminary results of the analysis are presented.



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M 45



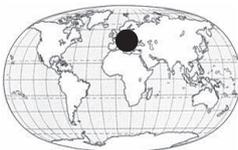
RAGWEED'S (*AMBROSIA*) POLLEN IN AEROPLANCTON OF UPPER SILESIA (SOUTH POLAND)

keywords: Ragweed, *Ambrosia*, pollen concentration, allergen, Upper Silesia, Poland

Ragweed's pollen is a strong allergen considered the most dangerous pollen allergens in the world. It is the most common cause of pollen allergy in North America where it is an economically burdensome pest in many regions.

Ragweed species have been introduced into Europe already in the 19th century with imported grain, soybean, clover and alfalfa as well as with ship ballast. They have spread in many regions after World War II, especially in the southern and south-western part of the continent. Three species have hitherto been recorded from Poland: *Ambrosia artemisiifolia* L., *Ambrosia psilostachya* DC. = *A. coronopifolia* Torr. et Grey and *Ambrosia trifida* L. The first two taxa have the status of naturalised species in our country, while *A. trifida* is regarded as a casual alien species. *A. artemisiifolia* occurs most frequently both in Europe and in Poland.

Aeroplanton investigations have been conducted in 1998-2004 in cities in the Upper Silesia urban area using the volumetric method (Burkard's apparatus) and the gravimetric method. Presence of ragweed's pollen has been confirmed every year in all assay points from August until mid-October. The beginning and length of pollen seasons were different in particular research years and measuring points. The periods of maximum pollen concentrations in the atmosphere happened at different times. The annual sums of pollen grains and maximum values of the twenty-four hour concentration were significantly different in the research years. Observations performed during many years show fluctuations in ragweed's pollen concentration and do not allow implicating any increasing tendency. This fact may be linked to the small number of localities of these species in the study region. However, one should not disregard the possibility of long-distance pollen transfer by wind from the Czech Republic, Slovakia, Ukraine and Hungary. Earlier forecasts of ragweed invasion in Poland where it was predicted to encroach with time on grassy hillsides, dry pastures and arable fields on sand have hitherto not come true. Although ragweed is included in the quarantine weed list in Poland, it does not yet constitute a major threat. Still, it requires alert attention in Poland due to the spreading tendencies in shows currently in neighbouring countries.



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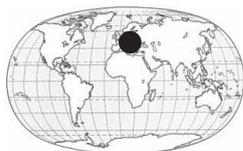
M 16



INVASION OF WOODLAND COMMUNITIES IN THE LIGHT OF PHYTOSOCIOLOGICAL STUDIES

keywords: forest communities, phytosociology, neophytes, Poland

In the Silesian-Krakow Upland, region situated in southern Poland geobotanical studies in forests were conducted during the years 1997-2004. Total 416 phytosociological records with a presence of alien plant species (neophytes) were taken into analyses, including data completed from the literature. Relationships between abundance of aliens and chosen characteristics of forest communities, e.g. their structure and species composition manifested by participation of plant functional groups, were examined. In woodland communities there were 20 neophytes to be found. Amongst forbs the most frequent and abundant is *Impatiens parviflora* which, as the only one, is a true woodland species with a wide synecological amplitude. Of woody aliens, escaping from cultivation sites, *Quercus rubra* and *Padus serotina* predominate. Analysis of contribution of particular syntaxonomical groups, i.e. species from various phytosociological classes to forest vegetation, revealed different relationships. Species from *Quercus-Fagetea* are positively correlated with a frequency and cover of *Impatiens parviflora* and negatively correlated with alien trees, but there are positive correlations between them and species from *Vaccinio-Picetea* class. Detrended Correspondence Analysis (DCA) show that phytocoenoses with the presence of aliens differentiate along almost all environmental gradients expressed by mean values of Ellenberg indicators but there are no any statistical correlations between them and the frequency and abundance of alien species. Spearman rank correlation tests indicate that there is a weak negative correlation between number, cover-abundance of aliens and both diversity and abundance of native species. Thus, the results of the phytosociological study indirectly confirm negative impact of invasive alien species on biodiversity and support diversity-invasibility hypothesis. The study was partially funded by KBN, no. project 3 PO4 G 093 25.



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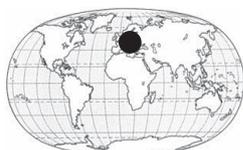
M 11



HABITAT REQUIREMENTS OF *IMPATIENS PARVIFLORA* DC IN THREE ADJACENT REGIONS OF SOUTHERN POLAND

keywords: *Impatiens parviflora*, Poland, autecology, habitats

In three neighboring regions situated in southern Poland, namely the Krakow-Czestochowa Upland, the Glubczyce Plateau and the Silesian Upland, differing in land use, soils and a type of forest vegetation, the autecological studies on one of the most invasive alien species of the country - small balsam *Impatiens parviflora* - were conducted. Habitat requirements of *I. parviflora* were estimated in 97 permanent plots, randomly distributed in various forest communities, differing in the percentage cover of *I. parviflora*. Physical and chemical properties of soils, canopy cover, slope and aspect were analysed in relation to the abundance of *I. parviflora* and a type of forest community. There were distinctive differences between the regions studied in granulometric composition of the soils, their pH level, the content of organic matter, P, K, Mg, and Ca in substratum. In contrast, no significant differences in N and Na content were detected. There were no significant relationships between the percentage cover of the species studied and a slope and the cover of a tree canopy. On the other hand, the results indicate that *I. parviflora* predominantly occurs in colder, northern slopes rather than in warmer slopes of southern and south-western aspect. The study shows that small balsam is a species with a wide ecological amplitude, which enhances its success in colonizing and persisting in different forest communities, regardless of the physical and chemical properties of the soils. The study was partially funded by KBN, no. project 3 PO4 G 093 25.



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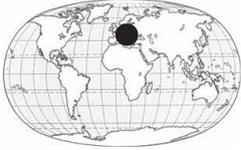
M 7



RESEARCH OF THE ARTHROPOD FAUNA OF THE SMALL BALSAM (*IMPATIENS PARVIFLORA* DC.) AND THE FIREWEED (*ERECHTITES HIERACIFOLIA* RAF. EX DC.)

keywords: *Impatiens parviflora* DC., *Erechtites hieracifolia* RAF. ex DC., arthropod fauna, interactions between plants and animals

According to the actual Hungarian list of neophytes the small balsam and the fireweed are both qualified as invasive neophytes. By the research of interactions between plants and animals were got information not only about effect of the adventives plant on the fauna, but also about the actual parasites that can cause serious damages and may be applicable for biological controll. 100-100 individuals of both plant species were examined to count the insects existing on them. This research revealed through direct or indirect feed connections 212 individuals of 45 arthropod species in case of the fireweeds and 1528 individuals of 17 species on the small balsam. On the fireweeds leaf miners were the most important phytophages, their tunnels occurred in 29 percentages of the plants. Phloem-suckers occurred in 28 percentages of plants: 17% chinchies, 5% cicadas, 6% aphides and wax insects. Aphidophages were presented by 4 species and appeared on 17 plants. Fireweed can be characterized by a very rich flower visitor fauna, altogether 42 specimens of 16 insects family visited the plant species. Also 16 specimens of 6 predator species were presented on fireweeds. Phytophages of the small balsam were leaf miners in the largest number; their tunnels have been found on 34 leaves of 20 plants. Phloem-suckers were the most remarkable group of the small balsam's insect fauna with 1442 aphides and 74% presence on plants. Afidophages occurred in 22% of the plants. Aphidophages were prey of spiders mainly, spider species involved four families. During the research quite poor fauna of flower-visitors including cockroaches (*Ectobiidae*), blossom beetles and tumbling flower beetles (*Mordellidae*) were found. Also several consumer organizations were observed, but no serious damage nor death of plant individuals of any species were recorded.



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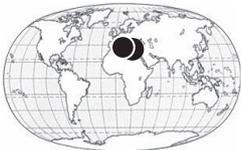
A 44



SOLIDAGO GRAMINIFOLIA IN POLAND: THE STATUS OF SPREAD

keywords: alien plant, anthropogenic habitats, Silesia

Solidago graminifolia is one of the North American species, which were introduced to Europe as ornamental plants and in Poland were naturalized in 19th century. But this species contrary to *Solidago gigantea* or *S. canadensis* yet did not show such expansive abilities to spread. In the 80 of 20th century there were known only 26 localities of the species in Poland. The vast majority of them were restricted to vicinity of Niemodlin in Opole Province. Estimations of the potential distribution of exotic goldenrods shows that their spread has not yet reached its limits on the territory of Europe and that expansion range of *S. gigantea* and *S. altissima* (= *S. canadensis* var. *scabra*) will continue. Large parts of Europe were estimated to be climatically suitable to *Solidago graminifolia* and discrepancy between current and potential range in Europe was highest in case of this species because of its restricted distribution. Our research conducted during last five years shows that actual distribution of the species in SW Poland and its occurrence in plant communities differs significantly from that known 20 years ago. The main aim of the study was to check actual distribution margins of the species, its occurrence in plant communities and habitat conditions. In SW Poland individuals of *S. graminifolia* nowadays are being noticed more often on abandoned field or meadows and in ruderal habitats e.g. quarries. Analysis of phytocoenoses with *S. graminifolia* shows its abilities to compete with many native species, among the other with grasses which form dense stands, as *Calamagrostis epigeios*, *Molinia caerulea*, *Phalaris arundinacea* or *Phragmites communis*. Individuals of *S. graminifolia* were also noticed in company of other alien species, as *Spiraea tomentosa*, *Rudbeckia laciniata*, *Solidago gigantea*. Together with those plants it forms stands mainly on banks of some rivers.



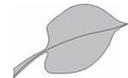
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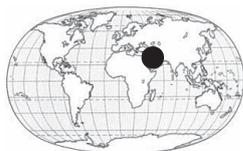
A 29



THE INVENTORY OF THE EXOTIC FLORA OF CRETE

keywords: alien flora, mediterranean islands

The Mediterranean comprises one of the largest group of islands in the world. The region is of high value to global biodiversity due to its diversity of plant species, relatively high rate of endemism, long history, and tolerance to many kind of disruptions. The continuous environmental pressure maintained by humans in the Mediterranean through history is now an inescapable component of all Mediterranean ecosystems and landscapes. However, over the last few decades, mainly since the 1960s, major socio-economic changes have increased the negative impact of such human activity, mainly along the coast and agricultural areas. In this respect, the islands are extremely vulnerable, as their small size increases the effects of disruptions. In particular, the islands of the Mediterranean basin are highly vulnerable to the entrance of alien species, e.g. due to their dependence on external trade, the high rate of urban development in coastal areas and the relative large communication network. The distribution of endemic and native taxa in the Mediterranean basin is relatively well known, although the lack of distribution maps sometimes makes difficult to obtain a global overview of the situation. On the contrary, the distribution of exotic species is less documented and fragmented and many Mediterranean islands lack updated checklists or maps of their exotic floras. To this aim a project is in progress, for the island of Crete, and it will hopefully have duration of three years (2005-2007). Preliminary results, main abundant species and operational logic are present herewith.



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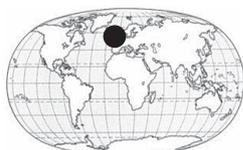
M 2



ASSESSMENT OF THE EFFECTIVENESS OF NUTRIENTS RECYCLING BY FERN (*AZOLLA*) IN THE CONTAMINATED AQUATIC SYSTEMS

keywords: *Azolla*, aquatic treatment, nitrate, phosphorus, ammonia

Azolla filiculoides Lam. (Water fern) has been assessed for growth and nitrogen and phosphorus removal in laboratory scale experiments comparing river water (A), river-to-wastewater in the ratios of 3:1 (B), 1:1 (C), and 1:3 (D) respectively; and primary treated domestic wastewater (E). Experiments were performed in batch mode with 10L of five water systems exposed to constant temperature and light intensity. *A. filiculoides* grown on mixtures of river-to-wastewater ratio of 1:1 (C) and 1:3 (D) exhibited maximum gain in fresh and dry weights. *A. filiculoides* was capable of efficient quantitative and qualitative algal reduction. Maximum efficiency in algal removal was achieved in mixture „C” (94.5%). The concentrations of Nitrate, Ammonia and Phosphorus in the five water systems decreased significantly ($p < 0.05$). The Ammonia rate of reduction was markedly high in mixtures enriched with wastewater with a complete depletion of any detectable nitrogen. The Nitrate removal efficiency was 100% after 8 days in all of five water systems. The Phosphorus rate of reduction was increased with increasing wastewater ratio. The Phosphorus removal efficiency after 16 days were: 60% in mixture “A”, 83% in mixture “B”, 94% in mixture “C”, 96% in mixture “D” and 86% in mixture “E”. The results obtained confirm using the *A. filiculoides* for tertiary treatment of municipal wastewater.



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M34



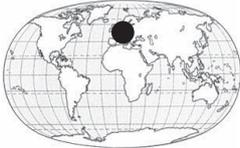
BIOHERBICIDES – A POTENTIAL TOOL IN THE FIGHT AGAINST WEEDS IN THE UK?

keywords: bioherbicides, indigenous fungi, weed biocontrol

Increased environmental concerns and pressures to reduce our reliance on chemical herbicides for pest control encourages biological control to play a significant role in the sustainable management of alien invasive plants.

When problem weeds are indigenous plants, plants which are a naturalised and established part of the flora, or indeed hold some horticultural significance, the conflicts of interests which would exist under classical control, necessitate the use of an alternative biological strategy. The exploitation of indigenous fungal plant pathogens as bioherbicides/mycoherbicides, is a relatively new weed control approach and involves the mass production, formulation and application of fungi in a manner analogous to chemical herbicide applications or as site-selective stump treatments.

The potential use of this environmentally beneficial method of control is reviewed for UK targets including *Rhododendron ponticum*, *Buddleja davidii* and *Senecio jacobaea* alongside examples of safely and successfully implemented commercial products.



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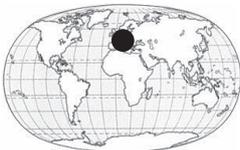
M 36



INVASION AND MANAGEMENT OF THE WATER PRIMROSE (*LUDWIGIA SP.*) IN FRANCE

keywords: water primrose, France, invasion, research, management

Water primrose (*Ludwigia sp.*) was accidentally introduced in France, from South America, at the beginning of the 19th century. Two species of this taxon are present: they are considered in France as the most harmful exotic aquatic plants. Their large ecological amplitude allowed them to colonize all kinds of aquatic ecosystems. Their easy vegetative reproduction and their strong capacity to create propagules (fragments of stems) permit them to colonize interconnected sites very quickly. The total colonization of aquatic biotopes by Water primrose creates very unfavorable conditions to the indigenous macrophyte populations and many others aquatic organisms. It also produces important nuisances opposite the human water body uses. Consequently, since about ten years, many managers had to do regulation interventions of these plant populations consisted in applications of herbicides, mechanical and manual extractions. Coordination within institutional managers is under creation to facilitate the information exchanges between different sites and several meetings took already place to confront data on these plants and their management. In order to increase, in the French context, the knowledge on the biology and the ecology of these plants, and facilitate their management, new researches have been recently undertaken in a specific research project in a national program started in 2003 on the biologic invasions (INVABIO). This project includes research on the biology and the ecology of these plants, their ethno botanical representation and the economic conditions of their management in different parts of France. The balance of this situation, that can be drawn up currently from different examples, shows a great diversity of the situations, the necessity of setting up a global analysis of the particular management of these plants, as well as the needs that remain to satisfy for this management.



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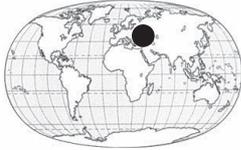
M 23



DOES LOCAL ADAPTATION CONTRIBUTE TO THE SUCCESS OF INVASIVE *BUDDLEJA DAVIDII*?

keywords: climate, evolution, common garden, differentiation

There is increasing evidence that the ability for microevolutionary adjustments to novel environmental conditions may be a key feature of successful invaders. For instance, local genetic adaptation can facilitate colonization of new habitats and lead to a further spread in the new area. We will investigate the importance of local adaptation during plant invasions using the Butterfly bush (*Buddleja davidii*, Buddlejaceae) as a model system. *B. davidii* is native to China and was introduced to Europe around 1890. It became naturalized in western and central Europe and is still spreading. In England and Switzerland, it is invading natural habitats, but in other countries it is common only on wasteland and along railways. In continental climates, the species is not invasive and in sub-continental climates, it does only occur in the centres of cities. However, frost resistance of *B. davidii* is very differently assessed in the literature. We hypothesize that frost damage is limiting the distributional range of invasive *B. davidii*, and that populations from different origins in Europe are locally adapted to climatic factors. We will test these two hypotheses using 20 invasive populations sampled across western and central Europe. Two progeny of 5 individuals from each of these populations will be planted in a common garden experiment replicated in three central European regions ranging from an oceanic to a sub-continental climate. A second experimental approach will be carried out in a sub-continental region in central Germany. We will plant different *B. davidii* genotypes at six sites along a temperature gradient in an urban area. The temperature gradient will be based on previous measurements and the degree of sealing. In both experiments, we will measure survival, growth, frost damage, and seed production. In this poster, we will present our experimental design and preliminary results of the ongoing project.



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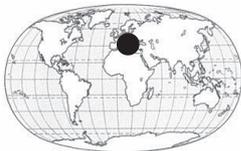
A 14



ARMENIA AS A POSSIBLE SOURCE FOR BIO-CONTROL OF INVASIVE WEEDS

keywords: flora of Armenia, natural ecosystems, bio-control

Armenia is situated at the junction of two floristic provinces - Caucasian and Armeno-Iranian (Takhtajan, 1986). The peculiarity of each, enhanced by vertical zonation, is the cause of the great variety of the country's vascular flora and vegetation. About 3500 vascular plant species occur on its territory, slightly more than the average figure for Mediterranean countries - a remarkable amount of biodiversity. One reason - beside mosaic conditions, relief variation, diverse geological history, etc. - is that Armenia is situated between two very distinct phytogeographical domains: the Boreal and Ancient Mediterranean Subkingdoms of Takhtadzhjan (1986). Armenia is a country where many invasive weed species took their origin. There are 4 Armenian plant species in the list of '100 of the Worlds Worst Invasive Alien Species' (ISSG/IUCN) - *Arundo donax*, *Imperata cylindrica*, *Lythrum salicaria*, *Tamarix ramosissima*. These species are not invasive in Armenia yet. More than 40 species are growing in Armenia, and at the same time they are very dangerous weeds in the North America. Also we can notice *Heracleum sosnowskyi* (close relative to *H. mantegazzianum*) and *Nymphoides peltata* growing in Armenia and are invasive weeds in Europe and North America. According to our data many species now show their invasive potential in threatened natural ecosystems - *Geranium tuberosum*, *Cirsium congestum*, *Centaurea behen*, *Lepidium vesicarium*, *Xeranthemum squarrosum*, *Tripleurospermum transcaucasicum*, *Euphorbia seguieriana*, *Cardaria draba*, *Cirsium arvense*, *C. incanum*, etc. Investigation of potentially invasive species in Armenia may be very important for different countries around the World. It is necessary to investigate populations of invasive and potentially invasive plant species and insects, fungus.

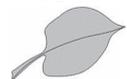


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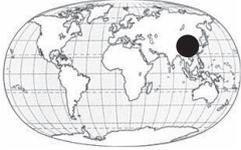
M 44



CONBTRIBUTION TO THE MECHANICAL REGULATION OF INVASIVE *HELIANTHUS TUBEROSUS* POPULATIONS

keywords: control, *Helianthus tuberosus*, invasive plant, Jerusalem Artichoke, mechanical regulation

Helianthus tuberosus (Jerusalem Artichoke) is a perennial reproduced from seeds and spread primarily by tuberbearing rhizomes. It is one of the most dangerous invasive plant species in Central Europe, including Slovakia. Its population and growth dynamics have not been studied yet in details and no effective control method is known to regulate its spreading. The impact (effect) of mechanical regulation of *H. tuberosus* stands has been studied by comparison of both mown and not mown populations (cuttings were done two or four times per year). Until June, the old tubers produced in the previous year had been exhausted by fast spring growth of shoots. After that, the above-ground biomass was removed as a part of the control method, so no energy and organic nutrients were accessible for new tubers production. In September, after a regeneration of above-ground shoots, the cutting was repeated. As a result of this, there was not enough time for the regeneration of shoots and forming new tubers before winter. The number of shoots and the underground biomass weight were reduced on every mown research plot, therefore mechanical regulation may be proposed as a possible control method.



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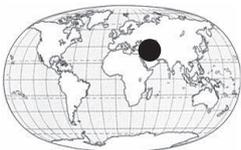
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BIOMASS ALLOCATION, MORPHOLOGY AND PHYSIOLOGY OF INVASIVE AND NONINVASIVE EXOTIC PLANT SPECIES GROWN IN FIVE IRRADIANCE LEVELS

keywords: *Ageratina adenophora*, *Gynura sp.*, invasiveness, Growth related traits, Light levels

Ageratina adenophora is noxious invasive plant species in southwest China, while the impact of *Gynura sp.* was small in this area. We studied their morphology, growth, and biomass allocation in seedlings grown under 4 light levels for more than 50 days. At low light plants enhanced light interception through increasing plant height, decreasing branch, and increasing biomass allocation to leaves and forming big-sized, thin leaves with high specific leaf area (SLA), leading a high leaf area ratio (LAR). At high light plants reduced transpiration losses and increased carbon gain by making small-sized, thick leaves with a low SLA, leading to a low LAR and leaf area root mass ratio. Under most of light regimes, compared with *Gynura sp.* *A. adenophora* was higher in Leaf mass ratio (LMR), leaf mass fraction (LMF), LAR, root mass ratio and root mass/crown mass, but lower in supporting organs biomass ratio (SBR), MLA and branch number. In 100% irradiance, LMR, LMF, and leaf area index of *A. adenophora* were higher, and leaves were much more self-shaded. This might be a strategy for its vigorous invasiveness because high-shaded canopy could prevent other plant species surviving and growing under it. The branches of *Gynura sp.* was much more in 100% irradiance than in other light regimes. This was beneficial for *Gynura sp.* because more branches could produce more flowers and then more seeds. The relative growth rate (RGR) increased with the increase of light intensity in *A. adenophora*, but decreased in *Gynura sp.* With the decrease of light intensity, both *A. adenophora* and *Gynura sp.* tried to intercept more light energy by growing higher and fewer branching. All these results presented above indicated that *A. adenophora* acclimated more adequately to light conditions, especially to low light regimes, than *Gynura sp.*, and its light acclimation advantage might explain its greater invasiveness.



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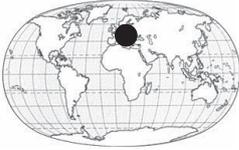
M 3



EVALUATION OF *AZOLLA* INVASION TO THE IRANIAN FRESHWATER SYSTEM

keywords: *Azolla filiculoides*, invasion, growth rate, Iran

Azolla filiculoides Lam. is an exotic species, which has occupied a vast surface of freshwater in the north of Iran. Excessive growth of *Azolla*, has not only interfered with the use of water resource, but has also created ecological and water quality problems. *Azolla* has generally invaded freshwaters with hard water, abundant nutrients with heavy use of human. To determine the reasons for *Azolla* excessive growth, three experiments were undertaken under laboratory and field conditions during 2000-2004. Results showed that rapid growth rate, high reproductive capacity and rapid dispersal of *Azolla* allow it to exploit environments with frequent disturbances. The results revealed that maximum relative growth rate (0.11 gg-1day-1) and minimum doubling time (6.27 days) were observed during May to August. The growth rate and doubling time record for *Azolla* in this investigation illustrates its rapid colonizing ability. Results showed that rapid grow of *Azolla* to the water surface had allowed the plants capture the maximum of sunlight, which cause degraded water quality and habitat conditions.



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M 24

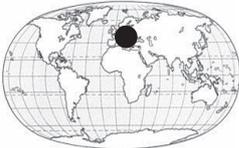


THE SPREAD OF ALIEN PLANTS AS A SIDE EFFECT OF THE ACTIVITY OF BOTANICAL GARDENS - DISPERSAL MODELS

keywords: botanical gardens, plant introduction, plant migration, models of migration

Botanical gardens (in short: BGs) have a distinctive character due to the fact that these institutions contain a wide variety of plants, as well to the regular international exchange of plant material between the gardens. Therefore a specific group of weeds strongly associated with BGs can be recognized, consisting of invasive garden escapes and unintentionally introduced weeds, which have persisted in BGs for a long time. Their dispersal history in Central Europe was analyzed with respect to historical data (herbarium and literature data from the 19th and 20th centuries) and the authors' findings (in Polish BGs, 1992-1999). Early stages of the species dispersal were presented as 5 theoretical models:

- *Impatiens parviflora*: intentional introduction into one BG intentional introductions from one BG to many BGs spontaneous spread from many BGs;
- *Galinsoga parviflora* and *G. ciliata*: intentional introduction into several BGs intentional introductions into many BGs spontaneous spread from many BGs;
- *Elodea canadensis*: unintentional introduction to Europe (not into BG) intentional introduction into BGs (as well as the spread of the plant from other sources) spontaneous spread from one (or many?) BG (as well as the spread of the plant from other sources);
- *Euphorbia humifusa* and *E. maculata*: intentional introduction into BG unintentional introduction into other BGs (due to the exchange of plant material) long-term persistence in BGs (with weak tendency to spread outside);
- *Cuscuta gronovii*, *Veronica peregrina*, *Oxalis stricta* and *O. corniculata*: unintentional introduction into BG unintentional (rarely intentional) introductions into other BG.



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M 41



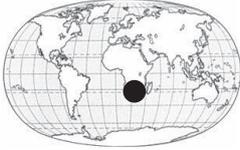
ECOLOGICAL ASPECTS OF INVASIVENESS OF THE GOLDENROD GENUS *SOLIDAGO* L. IN CASE OF EASTERN SECTION OF THE BESKID ZYWIECKI, SOUTH POLAND

keywords: invasive plant species, phytogeography, *Solidago*, land use

The alien perennial forbs *Solidago canadensis* and *S. gigantea* became aggressive invaders appearing vigorously across its non-indigenous range in Europe.

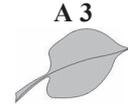
A survey concerning spatial patterns of distribution was carried out in eastern section of the Beskid Zywiecki, South Poland. Fieldwork data gathered between 2000 – 2004 were mapped and analyzed within the frame of altitudinal and ecological gradient. Habitat occupancy tendencies and type of plant community especially in relation to site elevation and land use were also examined.

The study enlists all documented types of habitats in which both species occur. The results suggest that patterns of species distribution in part stays determined by proper habitat availability, with *Solidago canadensis* being observed on wider array of habitats, ranging from open field meadows to forest clearings and from intact areas to sites marked with apparent anthropogenic disturbances, easily reaching higher elevated exposures and much outnumbering second species. In reverse, *Solidago gigantea* populations were found to be much constrained in habitat type, mostly reaching lower locations, however covering the area more densely when present.



Gené GUTHRIE

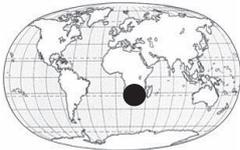
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IMPACTS OF *ARUNDO DONAX* ON RIPARIAN BIODIVERSITY: COMPOSITION, STRUCTURE AND FUNCTION

keywords: invasive plants, biodiversity, *Arundo donax*, fire behavior, decomposition

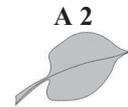
Invasive alien plants have long since had a bad reputation due to their damaging impacts on indigenous biodiversity. However, the impacts on biodiversity have been and are difficult to quantify because of the range of definitions of biodiversity. In this study we use a characterization of biodiversity as used by Noss (1990). According to Noss (1990), biodiversity can be divided into different components: composition, structure and functioning of ecosystems. Composition has to do with the identity and variety of elements in a collection. Structure is the physical organization or pattern of a system. Function involves evolutionary and ecological processes, including disturbances and nutrient cycling. These components are further divided into different levels or scales: regional-landscape, community-ecosystem and population-species levels. By assessing impacts on biodiversity according to this characterization we can assess the impact on biodiversity as a whole. We look at the impacts on biodiversity of the invasive alien reed *Arundo donax*. *Arundo donax* is an invasive alien reed in many parts of the world. Mostly, *A. donax* occupies riparian habitats and tends to form monocultures. The study will take place in riparian areas dominated by *A. donax*, and will include plant and aquatic invertebrate diversity assessments; fire behavior models; measurements of decomposition of *A. donax* material over time; and measurement of growth rates of mature *A. donax* plants under various treatments over time. We hypothesize that riparian habitats of rivers dominated by *A. donax* (1) become poor in indigenous vegetation and ultimately become monocultures of *A. donax*, (2) have fewer indigenous aquatic invertebrates, (3) have changed fire behavior, and (4) are nutrient-poor because *A. donax* is a high nutrient user and decomposes very slowly.



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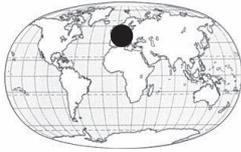
IMPACTS OF THE INVASIVE SPECIES *ARUNDO DONAX* (GIANT REED) ON BIODIVERSITY AT THE COMMUNITY-ECOSYSTEM LEVEL

keywords: *Arundo donax*, biodiversity, community-ecosystem

Arundo donax is an invasive alien reed in many parts of the world. In California, *A. donax* causes flooding and fires, and displaces indigenous plants. Both South Africa and California have a Mediterranean-type climate, thus the impacts on ecosystems are likely to be similar. In South Africa, *A. donax* has been classified as a category 1 invader (declared weed), meaning that its destructive potential has already been realised. The impacts of *A. donax* on biodiversity have not been assessed in the Western Cape, South Africa.

The impacts of invasive alien plants on biodiversity have been and are difficult to quantify because of the range of definitions of biodiversity. In this study we use a characterization of biodiversity as used by Noss (1990). Accordingly, biodiversity can be divided into different components: composition, structure and functioning of ecosystems. *Composition* has to do with the identity and variety of elements in a collection; *structure* is the physical organization or pattern of a system; and *function* involves evolutionary and ecological processes, including disturbances and nutrient cycling. Noss (1990) also divides the approach into different levels: genetic, population-species, community-ecosystem, and regional-landscape. We assess the impacts on biodiversity at the community-ecosystem level.

The study will assess these components by looking at plant and aquatic invertebrate diversity, fuel models, decomposition of *A. donax* and other material, and growth rates of mature *A. donax* plants under various treatments. We hypothesize that riparian habitats of rivers dominated by *A. donax* have (1) suppressed indigenous plant and aquatic invertebrate diversity, and (2) altered soil nutrient status and fire regimes.



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M 1



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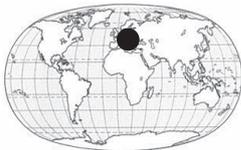
MORPHOLOGICAL RESPONSE OF TWO INVASIVE SPECIES, *ELODEA NUTTALLII* AND *ELODEA CANADENSIS*, TO THE TROPHIC LEVEL AND THE MINERALISATION OF WATER. AN EXPERIMENTAL STUDY IN CONTROLLED CONDITIONS OF LABORATORY

keywords: *Elodea*, invasion, trophy level, soft water, experimental study

Elodea canadensis Michx., *E. nuttallii* (Planch.) St. John were introduced in Europe in the 19th and 20th centuries, respectively. Several authors reported that the most recent invader, *E. nuttallii*, often replaces the ancient, *E. canadensis*, especially in nutrient-rich sites. The aim was to test the hypothesis that invasive populations have evolved traits likely to increase their success or alternatively that ecological determinant factors of communities may control invasiveness. The specific aims of this study were to determine, in controlled conditions of laboratory, i) the effect of trophic level (we test 2 concentrations of phosphates 20 and 100 g/l P-PO₄) on the growth of the two *Elodea* species, growing together or apart, and ii) the influence of the hardness of water, a factor we know to control the bioavailability of phosphorus. *Elodea* species were harvested in calcareous hard water, in a watercourse in the upper Rhine plain, (France), and, then cultivated in soft (acidic) water or in hard water.

The growth rate of plants was evaluated by measurements of fresh and dry weight, length of shoots, number and length of buds and lateral shoots, number and length of roots, and number and length of internodes. Measurements were compared by using a complete three way analysis of variance (ANOVA), on ranks, with factorial design.

Our first results showed that the growth of *E. nuttallii* was higher than that of *E. canadensis*, the dry weight, the length of shoots, of roots, of lateral shoots and of internodes are significantly greater. Surprisingly, we also noted that the culture conditions have an influence, as when the two species were cultivated together, *E. nuttallii* grew significantly more and had longer lateral shoots whereas the behavior of *E. canadensis* was not modified. The trophic level did not significantly influence the growth of the two *Elodea* directly, but the statistical analysis showed an interaction species-phosphate. Finally *E. nuttallii* has a greater capacity of growth in hard water than *E. canadensis* whatever the trophic level. From these results, the invasiveness seems to be due to the biological traits rather than the environmental factors.



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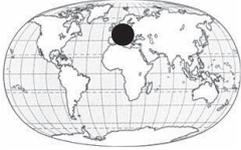


DISPERSAL OF INVASIVE CONIFER *PINUS STROBUS* IN THE SANDSTONE AREA OF THE BOHEMIAN SWITZERLAND (CZECH REPUBLIC)

keywords: dispersal, invasion, regeneration

Pinus strobus is an invasive tree in the sandstone areas in the Czech Republic. In many places it creates dense self-sown stands, which are suppressing the undergrowth vegetation and native tree regeneration. This study takes place in the Bohemian Switzerland. We studied distribution of self-sown trees of *P. strobus* in different habitats with respect to the distance of the diaspore sources and use these data to derive dispersal curve of the species. The data were confronted with a theoretical dispersal modelled on the basis of a seed terminal velocity and known wind speed. Further, we studied demography and habitat requirements of the species and plan to use these data to build a model of spread of the species in the landscape.

We found that (i) *Pinus strobus* density sharply decreases with distance from the seed trees and approaches nearly zero at the distance of 100 m. This prediction corresponds well with the seed dispersal under the wind prevailing in the area. While the short-distance dispersal affects most diaspores, we assume that it is less relevant for the spatial spread. (ii) Only small fraction of the self-sown trees was found further than 100 m suggesting that long-distance dispersal is rare. Nevertheless, it may be the driving force of the whole invasion process. (iii) There are significant differences in regeneration in the different habitats along the sandstone microclimate gradient.



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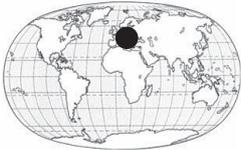
M 14



ECOLOGICAL FOREIGNNESS: THE DIFFERENCE BETWEEN ALIEN AND NATIVE

keywords: impact, coevolution, adaptation, new weapons, predators

Many invasive species perform and behave differently in the new area compared to the home range, and the impact they exert on the communities in the new area does in many cases differ from the impact they have on coevolved communities. Invasion literature discusses mainly two reasons for these differences: a lack of specialist predators, or the ability to use *new weapons* the resident species are not adapted to. The contribution will show that the concept of *ecological foreignness* is suitable to synthesise these and other aspects and to give an integrative explanation for the differences in behaviour of species in their adventive versus their new range. Initial event for a biological invasion is the passing of a barrier to dispersal. As a consequence of this event, the invading species is present in an area where it did not evolve. This, in turn, leads to an *ecological foreignness* of the species: the communities as well as the abiotic conditions it is confronted with will only by chance be similar to the ones it is adapted to. At the one hand, this is the reason why so many introductions fail to become invasions, but on the other hand this foreignness in some cases can be advantageous for the aliens, as the examples of *new weapons* or the lack of predators show. There are different ways of being *foreign* to a new area: a species can be foreign in an ecological sense, if it e.g. belongs to a life form which was not present in the area before, or it could be foreign in a taxonomical sense (i.e. no congeners in the new area). The contribution will show, that a differentiation of these types of foreignness may help us to explain differences in impact of an invader in its adventive versus its home range. Finally, we will discuss the hypothesis that the impact of an invasive species on a community is stronger the *more foreign* the species is to this community.



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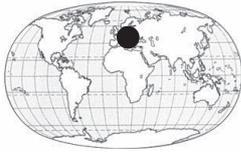
M 8



IMPACT OF INVASIVE SPECIES ON THE SPECIES RICHNESS OF RESIDENT COMMUNITIES AND THE ROLE OF HABITAT IN PLANT INVASIONS

keywords: dominance, impact, species diversity, Czech Republic

A field study was carried out to answer the following questions: (i) How do invasive species influence plant communities? In addition, to obtain a general overview of the role of habitat in plant invasions, literature data on neophytes naturalized in Czech Republic were reviewed, with an aim to explore (ii) whether there is a correspondence between habitats occupied by neophytes in their native and introduced ranges, and (iii) whether neophytes from different primary habitats differ in their invasiveness. *Heracleum mantegazzianum* (monocarpic perennial), *Impatiens glandulifera* (annual), *Lupinus polyphyllus* (polycarpic perennial) and *Reynoutria taxa* (clonal perennials) were studied in the field. For each, vegetation records of heavily invaded vegetation (60–100% cover) were compared with records of nearby not yet invaded plant communities. Taxa of genus *Reynoutria* and *H. mantegazzianum* reduced the species richness most severely, by 76.3% and 49.2%, respectively. Only a few ruderal species are able to grow under the cover of these invaders. The invasion by *L. polyphyllus* does not reduce the species richness substantially (17.4%), but results in changes in species composition, with increased representation of nitrogen-demanding ruderal species. This is likely to be caused by nitrogen fixing ability of the invading dominant. The effect of *I. glandulifera* on species richness of invaded sites was minor. On average 10±1.8 species of riparian communities occurred in stands dominated by this species. The reduction of species number (9.9%) was not statistically significant ($p = 0.096$) and neither was the change in community composition ($p = 0.268$). This makes *Impatiens* an exceptional example of a fast spreading invader, impact of which is restricted to suppressing dominant species but allowing them to re-colonize, as proven experimentally.



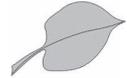
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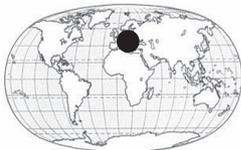
A 39



LINDERNIA DUBIA IN THE CZECH REPUBLIC: DISTRIBUTION AND ECOLOGY

keywords: *Lindernia* species, neophyte, exposed bottoms, storage ponds, southern Bohemia

Lindernia dubia is a North American species colonizing mainly muddy big river banks. It was imported to Europe in the middle of the 19th century. The species has been spreading from France and Italy into Central and Eastern European countries, probably with waterfowl and men. In the Czech Republic *L. dubia* was firstly found in 1989 in southern Bohemia. Nowadays 8 localities are known for this species. At 4 localities it has been observed by authors; other 4 localities are known from literature. The most abundant population of neophytic *L. dubia* was found together with native species *L. procumbens* on exposed bottoms of storage ponds in the town of Hluboká nad Vltavou, southern Bohemia. We compared the ecological requirements of both species following data of phytosociological relevés. Both species are thermophilous herbs. In storage ponds (Hluboká nad Vltavou) the seedlings of both species appear generally at the same time – at the end of May or beginning of June. Development of vegetation on exposed bottoms of storage ponds depends on time of ponds drying. In case of early drying period – before germination time of *Lindernia* species, the storage ponds are overgrown by vegetation. Then, in the end of May *L. procumbens* is not able to penetrate into vegetation anymore. Beyond that *L. dubia*, thank to its more robust growth than *L. procumbens*, has a capability to penetrate on these taller plant stands. If storage ponds are dried in germinating period of *Lindernia* species, than both species successfully participates on the succession from the beginning and have the best conditions to colonize free space of exposed storage pond bottoms. It is likely that *L. dubia* is competitively stronger herb than *L. procumbens*. Therefore its spreading is expected. In this connection there is meantime unconfirmed assumption of invasiveness of *L. dubia*.



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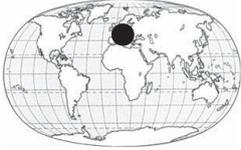
A 55



POTENTIAL DISTRIBUTION MODELING OF THE INVASIVE TREE ACER NEGUNDO IN THE CZECH REPUBLIC

key words: distribution, modeling, GLM, GAM, *Acer negundo*

Information about *Acer negundo* distribution was investigated using recently collected data from national mapping, from national phytosociological database and observed in two last seasons. Topological (elevation, slope, aspect and their combination), climatic (mean annual temperature, mean annual sum of precipitation), geographic (roads, rivers, towns, railways) and thematic (potential vegetation, geology, land cover) GIS layers were used as predictors of boxelder naturalization sites. Several models based on logistic regression (GLM, GAM) were fitted and prediction of potential naturalization sites was performed. 6 different models were built to compare more approaches different in model type and in complexity. GAM models seemed the most accurate following training datasets and are suitable for prediction based on large distribution database. GLM models are more sensitive in case of categorical variable input and such as can be used for process of predictors selection. The predictors selection as well as prediction in different scales were partially analysed and will be deeper discussed in following study.



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M 19



DISTRIBUTION AND ESTABLISHMENT OF *ROSA RUGOSA* IN DUNE VEGETATION

keywords: coastal dunes, shrub encroachment, species richness, Wadden Sea

Species-rich dune grasslands and heaths of the Wadden Sea Islands are threatened by the encroachment of shrubs such as *Hippophae rhamnoides* or *Rosa rugosa*. The dune vegetation of the islands presents a typical landward zonation from the beach across the yellow dunes to the more stabilized grey dunes and, in the oldest parts, brown dunes characterized by dwarf-shrub heath.

Vegetation analyses considered the whole dune series and compared plots with and without *Rosa rugosa*. The total cover of the different vegetation layers, the percent cover of *R. rugosa*, and all other species were recorded. In addition, soil parameters (pH, organic matter, C, N, C/N, water content) were determined. Furthermore, the relative irradiance was investigated by comparing the light intensity beneath and outside the *Rosa*-scrub.

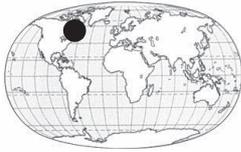
The vegetation types (*Ammophila*-vegetation, *Corynephorus*-sward, *Empetrum*-heath and *Rosa*-scrub) were characterized by different values of the soil parameters. The soil variables of the scrub were more or less similar across all dune types, indicating that *R. rugosa* creates its own uniform habitat. In general, the relative irradiance decreased very strongly with increasing cover of *R. rugosa*.

Vegetation parameters of *R. rugosa* shrubland was very similar in the different dune types. Distinct differences were found between the four vegetation types. Vegetation parameters were more similar between the *Ammophila*-vegetation and the *Corynephorus*-swards and between the *Empetrum*-heath and the *Rosa*-scrub. Scrub of *R. rugosa*, which is established in all of the three dry dune types, is often accompanied by the moss *Brachythecium rutabulum* and, is moreover characterized by the absence of other accompanying species. The majority of species showed a decrease in cover with increasing dominance of *R. rugosa*. Only few herbaceous species, which are in general typical shrubland-species, increased with increasing shrub cover.

In general, the total number of species decreased with increasing cover of *R. rugosa*.

Specifically, the number of typical shrubland-species slightly increased and the number of typical grassland-species decreased more strongly with increasing cover of *R. rugosa*. The number of threatened species declined in the species-rich *Corynephorus*-sward.

The encroachment of species-poor scrub types, e.g. with *R. rugosa*, which are characterized by the dominance of one or two shrub species and a simple vegetation structure reduces the species diversity. Especially species-rich dune vegetation could be threatened by the expansion of *Rosa rugosa*-scrub. These scrub types have a low conservation value and could present a serious conservation problem in dune habitats of our region.



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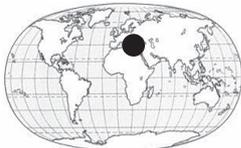
A 17



THE INVASIVE COMMON REED (*PHRAGMITES AUSTRALIS*) ALONG HIGHWAYS IN QUÉBEC (CANADA): A GENETIC AND BIOGEOGRAPHICAL ANALYSIS

keywords: *Phragmites australis* exotic genotype roadsides

During the last century, *Phragmites australis* (Cav.) Trin. ex Stued. (common reed) colonies expanded in marshes of northeastern North America. This species is highly problematical because it has a strong impact on plant and animal diversity. In the province of Québec (Canada), the spread of common reed coincided with the expansion of the highway network from 1963 to 1984. We hypothesized that highways contributed to the spread of common reed by creating dispersal corridors and favourable habitats to the growth of the species. To test this hypothesis, we mapped in 2003 the spatial distribution of common reed colonies along all Québec's highways (2800 km). We also sampled 260 populations to determine whether common reed found along highways is native or exotic. Globally, 24% of roadsides were invaded by common reed. Highest common reed densities (250 stems per m²) were registered near the city of Montréal, in the southwestern part of the province. In this region, common reed formed hedges several kilometres long. Genetic analyses indicated that 99% of common reed colonies found along highways were exotic (haplotype M from Eurasia). Only 3 out of 260 colonies were dominated by a North American genotype. The spread of common reed in Québec probably resulted from the introduction of an exotic genotype in the first part of the 20th century. This genotype likely benefited from the expansion of the highway network to establish new colonies in most regions of southern Québec. The maintenance of the highway network (ditch digging, roadside mowing) also probably contributed to the spread of common reed and to the improvement of growth conditions for the species.



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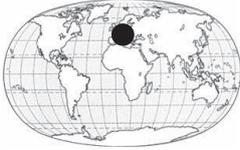
A 16



PLANT INVADERS IN THE FLORA OF SLOVENIA

keywords: IAS, invasive plants, Slovenia

In the territory of Slovenia about 30 plant species can be ranked as invaders in the narrower sense. That means that they are non-native and perfectly naturalized in natural or semi-natural habitat types where they are outcompeting the native flora and so radically changing the structure of the habitat. They were brought to Slovenia or neighboring countries at least half a century ago incidentally or deliberately (as ornamentals or other cultivated plants). In about one third of Slovenian plant invaders first records of their occurrence in the wild are more than a century old but in majority of them quick expansion of populations took place in the last 50 years. The most "invasion prone" habitats are riverine ecosystems and disturbed sub-Mediterranean forest, where in certain areas we could not recognize the native vegetation anymore because it has been completely replaced by a neophytic plant communities. About 2/3 of Slovenian plant invaders are native to North America and about 1/3 to East Asia where they are quite widespread in similar climatic conditions. One third of our plant invaders are phanerophytes and just a bit less hemicryptophytes and therophytes, respectively. All the field records and published data on occurrence of invaders is taken from the Flora Slovenia database at Centre for Cartography of Fauna and Flora, where also the detailed distribution maps with temporally differentiated data were prepared.



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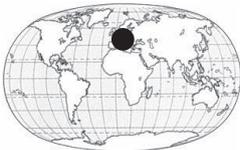
A 19



EDIBLE FRUIT, NUTS, VEGETABLES AND CROPS AS POTENTIAL INVASIVE PLANT TAXA: CASE STUDIES FROM THE RUHRGEBIET (GERMANY)

keywords: Germany, Ruhrgebiet, Northrhine-Westphalia, ergasiophytophytes, xenophytes

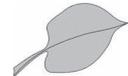
Ergasiophytophytic occurrences of most non-ornamental useful plants are accidental and often depend on waste disposal from gardens. In most cases such occurrences are ephemeral. On the other hand there are some typical habitats where edible plants from different sources can be found frequently and where establishment of such taxa can be studied. In the Ruhrgebiet, the former biggest industrial agglomeration in Europe, the river banks of the Rhine are such a typical habitat. Because the Ruhrgebiet is a highly anthropogenic region with many new, ecologically unstable habitats, escapes are frequently recorded and establishment of species found casually in other localities is possible. The development of some frequently recorded taxa to potential invasive plants are investigated thoroughly with case studies, e.g.: *Brassica napus*: Since the early 1990's spreading along roadsides, railways and channeled streams has been observed. *Ficus carica*: Since approx. 1995 persistence was proofed and some plants have started to generate fruits. The seeds tested were germinable. *Juglans regia*: Seedlings and young individuals have increased conspicuously – often without a potential founder tree nearby. *Physalis peruviana*: Has come into fashion within the last few years and escaped/xenophytic occurrences also increased. Highest frequency can be found on the Rhine banks, but “populations” seem to be casual and are founded every year anew from seeds. Other observed species are *Malus domestica*, *Ribes* spp., *Solanum lycopersicum* and *Rubus armeniacus*, the only invasive fruit known by now. Additionally, some curiosities are also studied, especially *Eriobotrya japonica*, a edible fruit in the Mediterranean, which is sometimes sold by turkish greengrocers. Some plants were grown in basement light shafts in front of a grocer's store and have survived for more than three years.



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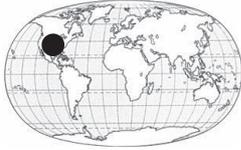
A 41



LINE MIGRATION AND TENDENCIES OF SPREAD OF *HERACLEUM MANTEGAZZIANUM* IN THE RUHRGEBIET (GERMANY)

keywords: *Heracleum*, Germany, line migration, river, roadside

One frequency centre of *Heracleum mantegazzianum* in the German state Northrhine-Westphalia is the riparian area of river Ruhr and its side valleys. The species was first detected in 1954 at Hagen-Dahl in the Volme valley, tributary of the Ruhr. While it was found at several locations in Westphalia in the following years no long distance dispersal of populations was indicated. But it seems that dispersal was overlooked, because after some years without new discoveries, in 1968 extended populations were investigated in the Volme valley. Probably, dispersal in this valley was caused mainly from the mentioned founder population. But in general there are additional effects of populations based on locally escaped individuals and more or less coherent line migrations. The present distribution along the Ruhr and its tributary waters seems to be a consequence of unidirectional line migration, but it resulted from a fusing of the distribution areas of numerous local escapes that spread in one or several directions. Today *H. mantegazzianum* is present within the whole extent of the Ruhr area, but not always represented by occurrences of high density. As the rivers are accompanied by roads, the line migration of the species also extends to the road sides, from which the dispersal of the species crosses over to roads in other directions. In the areas of Fröndenberg and Essen - Duisburg, the species migrated from the west-east directed Ruhr valley northwards along roads and spread along “Bundesstraße” 1 aka federal highway 40, a west-east directed road axis. In inner urban areas of the Ruhrgebiet occurrences of the Giant Hogweed are less frequent and, in most cases, their extensions are very local with few tendencies to long distance dispersal. Probably, habitats are too isolated and sometimes the species is controlled by municipal offices. The most important factor may be the decrease of fallow areas in urban regions.



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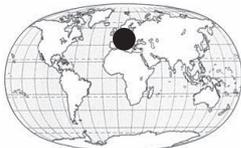
M 31



BIOLOGICAL CONTROL POTENTIAL OF *ARUNDO DONAX* (POACEAE) IN THE U.S.

keywords: *Arundo donax*, biological control, invasive weeds

Arundo donax is a widespread invasive grassy weed in California and the southwestern U.S. It is thought to originate in the Mediterranean area of Europe and to have been brought to North America by the early Spanish invaders. Collections of plant material for phylogenetic studies have been made from Nepal to the Canary Islands. It is a biocontrol target because of its intransigence to cultural and chemical control and its disastrous impact on the local ecology. *Arundo donax* in the Mediterranean region does not appear to be so invasive. On the average, 55% of an *A. donax* stand was dead in France and Spain compared to 22% in California. In France and Spain, 90% and 80%, respectively, of the canes in the 1-100cm length class were attacked by a Chloropid fly species; other important arthropod natural enemies are a Eurytomid wasp *Tetramesa* sp. and a Diaspid scale insect. No Chloropids were found in *Arundo* stands observed in California and Texas in 2003. Cane density per square meter was lower in France than in California and New Mexico where canes were significantly taller and thicker. In addition to the arthropods, several pathogens including bacteria, *Fusarium* spp., and *Nigrospora* sp. have been associated with cane death in Europe. The Chloropid species that attack *A. donax* in Europe are associated with a fungus and/or bacterium. From these preliminary results in Europe, it is clear that biological control has the potential to limit invasiveness of *A. donax*. Initially a search for natural enemies in areas of the weeds native range climatically similar to the regions infested in the U.S. would be needed. Evaluation of natural enemy host specificity and their impact on the weed would lead to selection of the most efficacious agents for release in the U.S.



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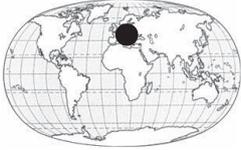
A NATIONAL SURVEY AS “BUTTON UP APPROACH” TO DETECT INVASIVE PLANT SPECIES IN GERMANY

keywords: invasive alien plants, national survey, Germany

Results of a national survey on alien plant species addressing 360 regional and local conservation authorities in Germany are demonstrated.

The amount of problems reported (96%) indicate that invasive alien plants are an important issue for conservationists in Germany. Even though 57 species have been mentioned all together, only four species/groups present over 50% of all records (*Heracleum mategazzianum*, *Impatiens glandulifera*, *Fallopia spec.*, *Solidago gigantea* and *S. canadensis*). Six other species/groups (*Robinia pseudoacacia*, *Prunus serotina*, *Elodea canadensis* and *E. nuttallii*, *Impatiens parviflora*, *Helianthus tuberosus*, *Lupinus polyphyllus*) cover 80% of the records and another 11 species have been mentioned more than ten times. There is only a few variation, but *Prunus serotina* and *Rosa rugosa* are more often mentioned in northern countries, *Robinia pseudoacacia* and *Acer negundo* in the eastern. On the basis of this data, 25 plant species can be regarded as invasive (in the meaning of threatening biodiversity) in Germany.

The data also reveals that this “button up” approach to detect alien species is not satisfactory. Participants are in most cases not able to describe problems in detail and they are often transcribed not on the impact but on the observation level. Although the named alien species are often considered problematic, only in 39% of all cases control measures are taken whereof only 23% are regarded as „successful“. Moreover, some problematic species are very rare but not less problematic (*Lysichiton americanus*, *Vaccinium angustifolium x corymbosum*). Therefore, a “top down” approach is needed, defining criteria for invasiveness for conservational purposes.



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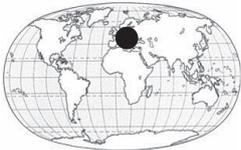
A 49



THE VARIABILITY IN MORPHOLOGY OF HERMAPHRODITIC FLOWERS OF SUBDIOECIOUS TREE BOX-ELDER (*ACER NEGUNDO* L.) IN INVASIVE POPULATIONS IN CENTRAL AND EASTERN POLAND

keywords: subdioecy, “distinctive selective forces” hypothesis, woody alien species

Acer negundo L. (box-elder) is a woody species native to North America. It is invasive on almost all other continents including Eurasia, South America and Australia. In its native range it has become a model dioecious species. However, the occurrence of hermaphrodite individuals in some populations in its invasive range has recently been reported. The aim of this study was to verify: what is the variability of stamens number in the hermaphroditic flowers at the level of a raceme and an individual in a number of invasive populations; whether any temporal variability exists, and finally – to what extent the occurrence of stamens affects female functions in flowers. We investigated 28 hermaphroditic individuals in 16 populations, located along 250 km long gradient from Białowieża to Warsaw in 2000, 2004 and 2005. We found that the occurrence of stamens in flowers of hermaphroditic individuals is highly variable at all levels. Studied individuals divide roughly into two groups: one with one or two single, small stamens per raceme, and the second with 4 to 20 large stamens per raceme. However, there were no flowers with 5 stamens, as in typical male flowers. Our research confirmed regular occurrence of hermaphroditism in the majority of individuals studied in 2000, 2004 and in 2005. Last part of our study indicates that at the level of a single flower the biomass allocation into female functions was inversely correlated with the number of stamens. We conclude that beside the substantial variability in the floral morphology the subdioecy is neither isolated nor ephemeral phenomenon in invasive populations of box-elder in Central and Eastern Poland. Its functional role has yet to be proven, but the occurrence of the phenomenon in the invasive, secondary range and not in primary one may pose interesting questions about the “distinctive selective forces” hypothesis and the importance of the dioecy in the success of invasion.



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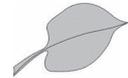
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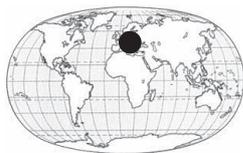
A 50



SOME ASPECTS OF VARIABILITY IN SMALL BALSAM (*IMPATIENS PARVIFLORA*)

keywords: *Impatiens parviflora*, variability, germination, mineral content, AFLP

We started studies on a broad range of issues concerning variability in *Impatiens parviflora* – from plant to plant variation in experimental populations to genetic variation at a geographical scale. Here, we report some preliminary results. (1) Germination trials were a necessary starting point for further experiments. Seeds, collected at several sites, were stratified at various temperatures. Stratification between layers of wet filter paper at variable temperatures about 0°C and slightly below resulted in the shortest time (12-16 weeks) to attain high ability to germinate (about 90%). (2) Variability in germination speed strongly depended on conditions. Germination of stratified seeds kept at about 5°C in the darkness spanned over 7 weeks. Seedlings appearing from fast-germinating seeds performed worse than those from the middle period of germination – in terms of height, stem diameter and chlorophyll content index. (3) In a glasshouse experiment, plants showed marked response to competition in terms of height, stem diameter, dry mass of parts, crown projection area, leaf size, branching. Both allometric relationships between size measures and patterns of size – mineral content relationships differed across population densities. The percentage of variation in element concentration explained by a set of size measures ranged from about 0% (for N and P at low population density) to 64% (for Zn at high density). (4) AFLP analyses suggested very low level of genetic polymorphism among selected Polish populations.



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M 20



HELIANTHUS TUBEROSUS L. PHYTOCOENOSES IN THE TOWNS OF UPPER SILESIAN INDUSTRIAL DISTRICT (SILESIAN UPLAND)

keywords: agriophyte, invasive plant, Upper Silesian Industrial District, ruderal phytocoenoses

Helianthus tuberosus L. is considered as an alien species of North-American origin in Polish flora (agriophyte). It was introduced into Europe in XVII century.

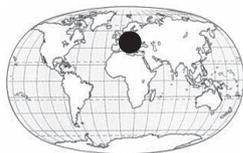
There were carried out phytosociological research in *H. tuberosus* L. aggregations during 1999-2004 years in towns of the Upper Silesian Industrial Region. *H. tuberosus* phytocoenoses occupy refuse dumps, edges of allotments and roadsides, urban wastelands or sites where the fresh soil layer was deposited. They do not cover large areas and can be found in the mosaics with ruderal or nitrophilous plant communities.

The collected material was ordinated with the use of PCA method. The relevés were also classified with the use of Cluster Analysis and the results of classification were imposed upon the ordination diagram. In order to show the floristic differentiation of *H. tuberosus* phytocoenoses the phytosociological table was made taking into account the above-mentioned classification.

In phytocoenoses of the investigated area apart from nitrophilous species from the *Convolvuletalia sepium* order a significant share have species from the *Arction* and *Convolvulo-Agropyrion* alliances owing to they approximates some phytocoenoses which were described by many authors.

It is a difficult community to place within phytosociological scheme. The phytocoenoses where kenophytes predominate, growing near willow thickets or carrs from the *Salicion albae* alliance, were included into the *Convolvulion sepium* alliance.

Kopecký (1985), Hejný et al. (1979), Oberdorfer (1983) placed *H. tuberosus* stands from the ruderal sites into the *Eu-Arction*, the *Dauco-Meliloton* or the *Aegopodion podagrariae* alliances. The phytocoenoses of the study area were classified in a community rank and grouped into the *Arction lappae* alliance and the *Onopordetalia acanthii* order.



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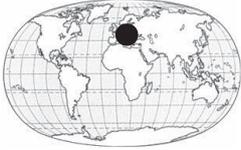
M 17



PHYTOCOENOSES WITH *BUNIAS ORIENTALIS* L. ON THE ANTHROPOGENIC HABITATS OF THE CRACOW-SILESIAN UPLAND (POLAND)

keywords: invasive plant, Cracow-Silesian Upland, *Bunias orientalis*, anthropogenic habitats habitats, ruderal communities

Bunias orientalis L. is considered as an epecophyte (Zajac et al. 1998) in Poland. The aims of research which were conducted during 1995-2004 years in chosen towns of the Cracow-Silesian Upland was to show the floristic differentiation of *B. orientalis* stands, their habitat preferences, to compare these phytocoenoses with others which can be found in some European countries and to determine if they should be considered as a separate association. There were made phytosociological research in ruderal habitats. On the basis of numerical analysis there were arranged phytosociological tables. The phytocoenoses apart from a dominant are made of ruderal species from the *Onopordetalia acanthii* order and the *Artemisietea* class and meadow species from the *Molinio-Arrhenatheretea* class. They occur among various ruderal and nitrophilous communities from the *Artemisietea* class, meadow associations from the *Molinio-Arrhenatheretea* class and some thermophilous thickets. At the first the phytocoenoses with *Bunias orientalis* were included into *Sisymbrietum sophiae* association (Fijałkowski 1966, 1968). Fijałkowski 1978; Święs, Kucharczyk 1982, Święs 1986 grouped them into a separate association *Bunidetum orientalis*. Mirek, Piękoś-Mirkowa (1992), who examined *Bunias orientalis* phytocoenoses in the northern sub-Tatra region pointed out their affinity with meadow communities from the *Polygono-Trisetion* alliance. Phytocoenoses from the study area show intermediate position between ruderal phytocoenoses from the *Onopordetalia acanthii* order and meadow communities from the *Molinio-Arrhenatheretea* class. Species from the *Stellarietea mediae* class do not play significant role in their floristic composition. According to our research they should be considered only as *Bunias orientalis* aggregations.



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A 45



KENOPHYTES IN THE RIVER VALLEY - THE VISTULA VALLEY AS AN ECOLOGICAL CORRIDOR

keywords: kenophytes, distribution, river valley, ecological corridor, Vistula river

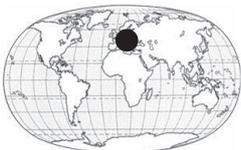
The Vistula river is the only large Central European river which has retained many of its natural features, especially in its middle course. The low degree of anthropogenic transformation allows one to conduct research on the dynamics of the distribution of alien plant species. So far, in the Lublin part of the Vistula valley, 1383 vascular plant species have been recorded, 124 of which are kenophytes.

To determine the role of different parts of the valley in the spread of kenophytes, the spatial distribution of epocophytes and agriophytes and the stability of their locations have been analysed. The distribution and frequency maps used in the study were made by a cartogramme method in grid of 1 x 1 km.

On the edges of the valley epocophytes occur numerously. It is connected with the location of rural and urban settlements. The percentage of kenophytes on the river terraces outside the embankments is the smallest. The number of agriophytes, and in part - epocophytes, increases on the floodplain.

Distribution patterns and the stability of locations point out to the different functions of the valley as an ecological corridor for different kenophytes:

- habitat and conduit - all analysed species are permanent elements of the flora, 25 kenophytes are of the river corridor plants type, they occur mainly on the floodplain and on slopes of the valley,
- sink - epocophytes enter the floodplain,
- source - a few species emanate from the floodplain to other parts of the valley and outside the valley.



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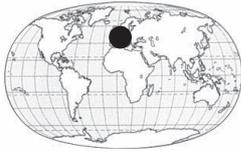
M 25



DISTRIBUTION OF INVASIVE PLANT SPECIES' TRAITS IN GERMANY

keywords: plant traits, Germany, successful invaders, risk analysis

Biological invasions are among the most important threats to biodiversity. Thus it is crucial to predict biological invasions. Usually species are in the focus of such analyses. Typical questions are e.g. which species may become invasive or what are the characteristic traits of species being invasive? Another important issue is the spatial prediction: where will invaders be found geographically? While much information exists on the distribution of invasive plant species the distribution of 'invasive traits' was never studied before. A comparison of traits of invasive vs. non-invasive species in Germany is conducted using the database BIOLFLOR. We will provide the current distribution of particular traits and their relative abundance in Germany. This is a pre-requisite to understand the relationship between traits of invasive species and the environment in a spatial context and to provide a complementary way for predicting biological invasions.



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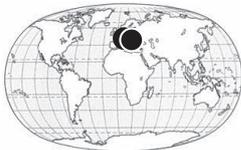
M 37



IMPORTANCE OF WATER PRIMROSE (*LUDWIGIA SPP*) MONITORING IN THE RIVER LOIRE VALLEY (WORLD HERITAGE AND EUROPEAN SITE) IN ORDER TO ORGANISE THE ECOLOGICAL MANAGEMENT AND THE BIODIVERSITY CONSERVATION

keywords: *Ludwigia*, invasion, river Loire, typology, European habitats

A French national program INVABIO: Biological Invasions started in 2003 linking researches about Water Primrose biology, ecology, ethnobotanical representation, propositions and economic conditions of management. The objective of this study concerns extension of Water Primroses, evaluation of their competition with native plants and European habitats, proposition of management procedures, development of a global conservation program to survey natural habitats which are highly influenced by extension of invasive species. The impact of Water Primroses is studied on the river Loire valley where *Ludwigia spp* are in great competition with European habitats (*Isoeto-Nanojuncetea*, *Chenopodion rubri p.p.*, *Bidenton p.p.*) in the river bed. The first surveys revealed the presence of *Ludwigia peploides* and *L. hexapetala* in homogeneous or heterogeneous vegetation where *L. hexapetala* appears to be dominant. The biotopes typology (river banks, emerging sand banks, ...) submitted to different ecological conditions emphasizes the large ecological amplitude of Water Primroses in the river Loire valley. It also shows their variability in the competition strategy within native plants or other invasive species as *Paspalum paspalodes*. The results of this competition will be presented in term of abundance and dominance of the species and with the description of the structures of the studied vegetations. The Park started to developed his own GIS to endow information and exchange with all partners. Synthetic maps over the different years, maps of extension of Water Primroses compared to the location of European habitats will be presented in order to propose management targets of this European site (choice of technologies to be used for limiting Water Primroses extension, amount of biomass to be considered, ...)



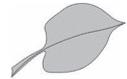
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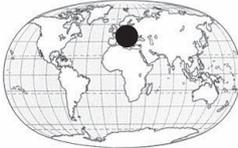
M 10



PATTERNS OF PLANT TRAITS IN ANNUAL SYNANTHROPIC VEGETATION ALONG THE URBANITY GRADIENT IN THE CZECH REPUBLIC

keywords: CCA, Central Europe, logistic regression, weed and ruderal vegetation

Variation in species composition and proportion of different plant traits was studied for annual weed and ruderal vegetation in the Czech Republic, with a focus on differences between agricultural and urban environments. A data set of 2715 plot records of species composition, which contained 1009 plots from cereal fields, 889 from root-crop fields, 401 from villages, and 416 from towns was used for the analysis. Detrended correspondence analysis revealed that major changes in species composition were associated with macroclimate variation (annual rainfall, mean annual temperature and elevation), seasonal changes and the year of record. Habitat type (arable field vs. settlement) had also significant effect on the species composition. To investigate structural changes in vegetation between arable fields and settlements, we subtracted the variation in species composition attributable to the other factors, using partial canonical correspondence analysis, and established a single constrained axis related to the urbanity gradient. Then we related this gradient to species traits, using logistic regression of traits on the constrained axis. The majority of traits considered showed a clear habitat dependence if the analysis was done with individual species, but some of these trends became weaker when the analysis was corrected for phylogenetic relationships among species. Moving from arable fields to settlements, archaeophytes decreased and neophytes increased, species reproduced only or mostly by seeds decreased and species reproduced by both seeds and vegetatively increased, annual species decreased and biennial and perennial-pollakanthic species increased. Therophytes decreased and phanerophytes increased, R-strategists decreased and C-strategists increased, species with persistent seed bank and species with overwintering green leaves decreased. Pollination mode shifts from insect, selfing a pseudocleistogamy on arable fields to wind in settlements.



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A 9



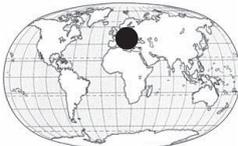
PULMONARIA RUBRA SCHOTT NATURALISED IN KAMIENNE MTS (SUDETY MTS, SW POLAND)

keywords: exotic species, hydrochory, garden escape, neophyte

Pulmonaria rubra is a woodland plant from SE Europe. A sizeable population was found along the Sokołowiec stream (Sokołowsko) in the Sudety Mts (SW Poland). This species has never been reported in the wild in Poland.

The species' distribution was mapped. It grows exclusively in the Sokołowiec stream valley, where three localities were found. The largest one (ca. 1000 individuals) occurs in a patch of natural flood-plain forest, where it, together with *Anemone nemorosa*, dominates the ground cover along nearly 100 m of the stream side. Some individuals managed to colonise the adjacent old spruce plantation. A population of about 100 individuals grows 300 m down the stream, exclusively in *Reynoutria sachalinensis* thickets. A third locality is a group of four individuals, another 300 m downstream, where it grows in a semi-shaded forb community (with such spp as *Rubus idaeus*, *Urtica dioica* and *Chaerophyllum aromaticum*).

The species has presumably escaped from cultivation as it is located a few hundred metres downstream from a once-fashionable resort, Sokołowsko. The likelihood of finding strange species of plants in Sokołowsko area is increased by the fact that it was there that princess Daisy Hochberg von Pless, an English aristocrat married to the German owner of the local forests, spent her last years. She was famous for her love of plants and she used to import exotic species to her estates. However no specimens were found growing in the gardens of Sokołowsko. Another explanation is that *P. rubra* was transported unintentionally with exotic trees or shrubs planted ca.100 years ago in the resort's park which is located a few hundred metres upstream. The occurrence of *P. rubra* in a well-preserved flood-plain forest indicates that it may spread further, as the species seems to flourish on the site and it has already achieved the status of neophyte.



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M 9



THE IMPACT OF REYNOUTRIA SACHALINENSIS ON VEGETATION - EXCLUSION OF TALL FORBS AND FACILITATION OF THE DEVELOPMENT OF ANCIENT WOODLAND FLORA

keywords: exotic species, succession, *Anemone*, Sudety Mts, ancient woodland indicators

Reynoutria sachalinensis is a very tall Asian perennial, which has been spreading in Europe recently. *Reynoutria* spp. spread by producing numerous suckers, and exclude other vegetation from the site. However most reports come from ruderal sites and less is known about its interactions with natural and semi-natural vegetation.

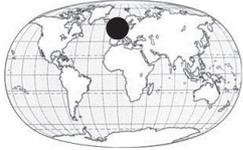
In order to estimate the impact of *R. sachalinensis* on species-rich semi-natural vegetation, the vegetation inside and outside three large clumps of *R. sachalinensis* (each 200-300 m²), growing along a stream in Sokołowsko (the Sudety Mts, SW Poland), was studied.

The studied area is a narrow strip of flood-plain located between a stream and a steep slope overgrown by spruce plantation. The area is an abandoned hay meadow with remnants of ancient forest vegetation, which now constitutes a successional mosaic of meadow and woodland species dominated by large forbs (*Petasites* sp. div., *Urtica dioica*, *Chaerophyllum aromaticum* etc. In this place three clumps of *Reynoutria* were found, each ca. 400 m apart.

In each *Reynoutria* clump the vegetation was sampled using four 2 x 2 m squares, i.e. two squares were set up 3 m outside the clump, up and downstream, and two squares were set up 3m into the centre of the *Reynoutria* clump.

The vegetation outside the clumps was much richer in species and none of the forbs clearly dominated. The vegetation under the *Reynoutria* canopy is sparse and is mainly constituted by spring-flowering typical ancient woodland indicators such as *Anemone nemorosa*, *A. ranunculoides*, *Ficaria verna* and *Leucojum vernum*. These species also occur in the surrounding meadows but they flower more abundantly in *Reynoutria* clumps.. Their good health and abundance can be attributed to the fact that a dense *Reynoutria* canopy appears in mid-May allowing the spring flora to develop, simultaneously excluding the competition from other tall forbs whose shoots develop earlier than those of *Reynoutria*.

In conclusion, *R. sachalinensis* is a serious danger for Sudety Mts streamside forb communities. On the other hand it creates good conditions of growth for some valuable woodland plants. *R. sachalinensis* can be viewed both as an inhibitor of succession as far as the development of tree canopy is concerned and as its facilitator where the herbaceous woodland flora is concerned.



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M 37-1



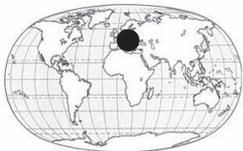
ASSESSMENT OF VIABILITY OF *FALLOPIA* SPP. (JAPANESE KNOTWEED) RHIZOME

keywords: Japanese knotweed, rhizome, viability

Observations at a variety of sites under a number of different treatment regimes over a period of several years have indicated the capacity of several large *Fallopia* species to remain in a semi dormant condition for periods which may extend into several years. Typically, no aerial shoots are evident, but the rhizome remains viable and capable of regenerating growth above ground when suitably stimulated. This growth pattern reflects the ability of the plant as a primary coloniser in volcanic areas.

Assessment of success of control treatments is frequently dependent on observation of presence or absence of aerial shoots. In view of the foregoing, this is not considered to be a reliable methodology as it not possible to tell, by this method, if the rhizomes are dormant or dead. The only currently available test for rhizome viability requires assessment of growth after incubation for 30 days.

In order to develop a more rapid methodology which can demonstrate definitively whether rhizome is capable of regeneration, a range of viability assessment techniques have been investigated. Initial results indicate that it is difficult to quantify tissue responses, but it is hoped that the work may lead to the development of an efficient, rapid test.



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A 4



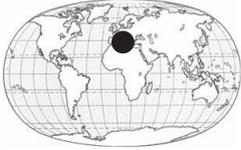
THE INVASION OF SUBHALOPHYTIC TATARIAN ORACHE (*ATRIPLEX TATARICA* L.) AND THE ROAD SALT DEICING IN WARSAW, POLAND

keywords: halophytes, roadsides, contamination

The Tatarian orache (*Atriplex tatarica* L.) is an invasive plant from Asia. We investigated the patterns of its occurrence in Warsaw, Poland. We hypothesised, that: a) the current spread of the species is wider than detected earlier, b) its occurrence is limited to roadsides along streets with salt deicing, and c) its occurrence across roadside depends on the local soil salt concentration.

We studied the occurrence of the species in the grid of 1sq. km used in earlier floristic studies, then we mapped its presence along more than 150km of streets, and finally set up 50 research plots composed of 150 to 300 0.25 sq. m quadrats. On each of ca. 6500 0.25 sq. m quadrat the abundances of the Tatarian orache, other vegetation and bare soil were assessed and mixed soil samples were taken.

Our results indicate that the Tatarian orache did get much more widespread in Warsaw in last 20 yrs, however, there seem to be little turnover in the set of colonised areas. The species seems to be almost completely limited to the roadsides along the streets sprayed with salt, not entering the side streets with no salt deicing. However, the abundance of the Tatarian orache is only partially correlated with the local soil salt content. We conclude that the invasion of such a sub-halophytic plant in the city need not to be the simple effect of the salinity of the roadsides. Other factors, like the heavy metal contamination and air and soil water deficit may play an important role in the promotion of such a species in a city.



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A 36



CHARACTERIZATION AND DISTRIBUTION OF EXOTIC FLORA IN THE RIPARIAN SYSTEM OF CEDRINO RIVER (SARDINIA, ITALY)

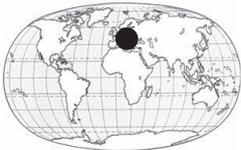
keywords: alien plants, riparian vegetation, mediterranean riparian ecosystems

Riparian ecosystems are very important habitats for the peculiarity of animal and vegetal species living there, and for the problems concerning their conservation and management.

Actually this habitats are recently touched by a general process of reduction, erosion and alteration. These phenomena are due to different factors as pollution anthropic uses, construction of dams and embankments, intentional or unintentional introduction of exotic species.

In this work we study the exotic component of the flora of Cedrino's riparian system (Sardinia, Italy), including Cedrino river and its most important tributaries: Sologo-Isalle and Flumineddu rivers.

The main objectives of our study are: 1) identification of exotic species presents in this system, 2) analysis of growth forms, chorological and phenological types, 3) analysis of distribution of species along the river system in relation to different environmental variables such as height, climate, geology.



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M 5



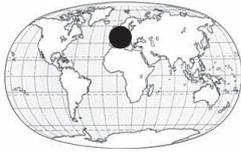
LAND USE DETERMINES GROWTH AND REPRODUCTION OF INVASIVE BOX-ELDER (*ACER NEGUNDO* L.) IN BIAŁOWIEŻA FOREST (NE POLAND)

keywords: woody alien species, life history traits, light availability, disturbances, body damages

Beside the impact of the global and local transport on the spatial spread of species, our understanding of the mechanisms of direct and indirect interactions of humans and invasive species is far from being exhaustive. The aim of this paper is to examine to what extent the life history traits of individuals of *Acer negundo* (box-elder) are modified in habitats differing in the light availability and the probability of damages due to land use. The study was carried out in a 25 km² large research plot located in the centre of the Białowieża Forest. The dbh of all stems and the height of all individuals were measured; the sex and the number of samara clusters was assessed and number of damages to the stems were noted. The age of individuals from various light environments was assessed using increment cores.

The individuals in the forest were higher, had lower dbh, stem number and the number of samara clusters, than outside the forest. In the forest, the minimum reproduction age was three times longer, the height of reproducing individuals - greater and the number of samara clusters produced by individuals in every age class smaller, than outside the forest. The impact of the land use intensity was different in forest and non-forest habitats. In the forest box-elder individuals occurred only in intensively managed pine plantations. The frequency of cut stems increased with the intensity of land use, but the regrowth of individuals was faster and more frequent in non-forest habitats. The time to the first reproduction after cutting of all stems of an individual was 50% shorter, than the time to the first reproduction after seed germination.

I conclude that the light availability and the probability of damages resulting from the human land-use both determine the invasibility of different habitats by the box-elder. At the landscape level, suitable and unsuitable habitat patches may function as a source-sink metapopulation, due to the unequal reproduction rate.



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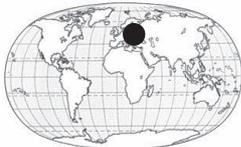
A 47



REGENERATIVE CAPACITIES OF TWO EXOTIC HYDROCHARITACEAE, *ELODEA NUTTALLII* AND *E. ERNSTIAE* IN RESPONSE TO FLOODING REGIMES

keywords: regeneration, *Elodea*, disturbance, flooding

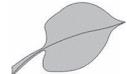
Elodea nuttallii and *E. ernstiae* are two exotic species found in North-Eastern France. If *E. nuttallii* has been invasive since 1990, *E. ernstiae* is recorded locally at low abundance. The main objectives of this project is to investigate why these species with similar ecological niches, morphological form and reproductive strategies display different invasiveness. We aim especially to determine if *E. ernstiae* shows less regeneration capacity than *E. nuttallii* while submitted to different flooding treatments. Two types of regenerative fragments were used, apical buds and 4-internodes stem fragments. They were put for one month into experimental containers fixed into three different sites in the Alsacian floodplain. These three sites were characterized by no connection, partial connection and regular connection with the Rhine and corresponded therefore to an increasing gradient of disturbance through flooding. The survival and growing capacities of the two types of fragments were surveyed for both species through the measurement of 9 morphological traits. Results show that plant regeneration depends on site connection to the Rhine and therefore to flooding duration and frequency. Besides, *E. ernstiae*'s fragments, either apical buds or stem fragments, display similar and sometimes higher growing capacities than *E. nuttallii*'s. This study suggests that *E. ernstiae*'s low invasiveness may be linked with other than regenerative life-traits.



Vida MOTIEKAITYTE

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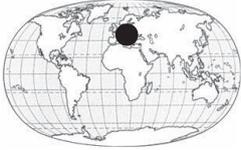
M 18



ECOLOGICAL CONDITIONS, RESOURCES, AND IMPACTS OF INVASIVE PLANTS IN AREA OF CLOSED LANDFILLS

keywords: neophytocoenoses, neophyte woods, species diversity

Investigations on neophytocoenoses and species diversity in wood communities of neophytes were accomplished in 4 closed landfills in Vilnius. Besides the Braun-Blanquet approach, the method of Kopecky and Hejny complementary vegetation classification was also employed. Special indices of species diversity were used. Leachate is the main factor of pollution in landfills. Before a few decades the closed landfills reached the methane stage. There were four large vegetation complexes distinguished. Phytocoenon *Sambuco racemosae-Aceretum negundi* (with three maturity stages) is one of most characteristic vegetation unit of complex of wood, shrub and ruderal herbs. It is spread in the areas with dangerous degree of contamination. Phytocoenon *Lamio albi-Prunetum cerasiferae* occupies the areas with very dangerous degree of contamination in the zone of pollutants infiltration. It is distinguished by the complexes of synanthropic ($N_{sa}=55.8\%$) and pliurizonic ($N=58.4\%$) species. In landfills the preoptimal (youthful) stage of phytocoenon *Sambuco racemosae-Aceretum negundi* has very low value of species uniformity, but its communities have already attained more than half of the maximum possible value of species diversity. Preoptimal stage (II maturity group) and optimal stage (III maturity group) of the phytocoenon together with phytocoenon *Lamio-Prunetum* (II maturity group) were distinguished by high condensation degree, showing the completeness of their formation. Irregularity of species abundance, rapid changes of structure, the maximum entropy not exceeding 0.7 are typical for neophyte woods. Neophyt herb species are notable for tendency to form monodominant layer of wood communities and for their high productivity, and on this basis, specific balance of matter and energy of ecosystems, maintaining their not typical structure, form. Biotic factors initiate the ruderalisation.



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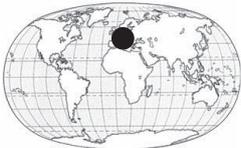
A 38



DISTRIBUTION AND HABITAT PREFERENCES OF KENOPHYTES OCCURRING IN BARLINEK-GORZÓW LANDSCAPE PARK (NW POLAND)

keywords: kenophytes, distribution, habitat preferences, NW Poland

The paper presents the distribution and habitat preferences of 77 kenophytes currently occurring in the area of Barlinek-Gorzów Landscape Park (240 km², NW Poland) and represents an attempt to estimate the resistance of particular habitats to invasion. The analyses were based on data obtained in 1998-2002 during field surveys on vascular plants in the Park. The study area was divided into 271 squares of 1x1 km size, coherent with the ATPOL grid – Atlas of distribution of vascular plants in Poland. Floristic notes were made inside each square, taking into consideration the whole range of habitats. Altogether 33 types of habitats were distinguished. Kenophytes most often invade transformed habitats. The most efficient colonizers of natural and semi natural phytocoenoses are as follows: *Impatiens parviflora*, *Padus serotina*, *Picea abies* and *Alnus incana*.



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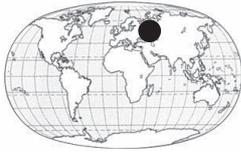
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AERIAL PHOTOGRAPHS AS A TOOL TO SURVEY AND INVASIVE HERBACEOUS PLANT: PROMISES AND PITFALLS

keywords: aerial photographs, *Heracleum mantegazzianum*, virtual ecologist, modelling

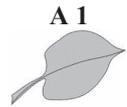
The Giant Hogweed (*Heracleum mantegazzianum* Somm. et Lev.) is known to be invasive since the 1950ies. The aim of the presented study was to create an individual-based model (IBM) to assist management decisions. Within a project to describe and prevent invasion of Giant Hogweed in Europe, we were concerned with local spread of the plant. Thus, it was essential for us, not only to reproduce demographic dynamics, but also spatial behaviour of a population (namely, spread rates). Today, the plant has formed extensive stands around its nascent focus in the Czech Republic. We had the opportunity to use a time series of aerial photographs to follow the different stages of local invasion, from the first plants till today stage. We used empirical data collected from those populations at their present state and parameterize a model of local spread. The model results then were compared with the dynamics visible on the aerial photographs, covering a time span of approximately 50 years. On the aerial photographs flowering plant could be identified and the area occupied by them calculated. We used a Virtual Ecologist approach to illustrate potential biases arising from this method. Discrepancies between IBM results and the insights gained from the time series are discussed for further adjustment of the IBM model. We also consider how the procedure could assist to predict potential spread of today small populations. An estimation of their future expansion would be helpful for management advice.



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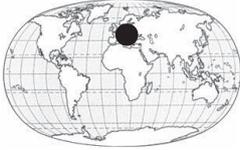
ON THE STUDY OF ALIEN FLORA GENESIS

keywords: alien flora, naturalization, historical analysis of alien flora

The numerous studies on regional alien floras have formed a sufficient basis for the historical analysis of alien floras. The growth of interest towards this problem can be explained by the high rate of the invasion process and the urgent need of prognosticating its results. Alien flora can also serve as a model object for studying the regularities of florogenetic processes and for their reconstruction.

When modeling the genesis of alien flora, it is necessary to take into account its specific characteristics. To compare to native flora, alien flora is characterized by a higher dynamics, inconsistency of its composition and structure, and active interaction with native and economic and ornamental components. This explains why alien flora has lower integrity, and why it is sometimes difficult to distinguish between alien and native components. On the one hand, alien flora is constantly enriched by economic and ornamental plants that become wild or by alien species that are native to other regions. On the other hand, the species composition of the regional floras can be considerably enlarged as a result of alien species naturalization. In this light the need in reconsidering the florogenetic and invasion status of all floras becomes apparent. The florogenetic status is determined by attributing a species to alien, native or economic floras. The invasion status can be determined by evaluating the persistency of an alien species in the regional flora. The evaluation technique is being actively developed.

The methods of historical reconstruction of alien flora genesis depend on the relative size (range) of the territory in question. With floras of relatively small areas you can easily distinguish between alien and native components, as the florogenetic status of the species is more or less defined. In this case it is possible to exclude natives and archeophytes. The aim of the analysis is to clarify the dynamics and the species composition of alien flora. The invasion dynamics of alien floras is well reflected in retrospective databases. Such databases have been already developed for some regions of Central Russia (the Tula and the Tver regions). In the course of work major types of florogenetic statuses have been determined (ephemerophytes, colonophytes, epekophytes, agriophytes), as well as their dynamics. With floras of larger regions it is necessary to take into account the fact that the same species can have a different status (native, archeophyte, established alien, casual alien) depending on the part of the region. In this case it is necessary to analyze alien and native floras simultaneously, and to evaluate florogenetic and invasion status for every part of the region. The study on the dynamics of alien flora in the smaller parts of large regions can help to define major migration waves, the rate of their movement, and the degree of spreading. It is impossible to create a retrospective database without active interaction between specialists on alien floras and taxonomists. The correct chronology of alien flora is possible only with references to map materials. Besides, the regional status of every individual species should be clearly defined. Perhaps, the best example of florogenetic status systematization can be found in Scandinavian Floras (Retkeilykasvio, 1998; Flora Nordica, 2000, 2001). The analysis of the map materials enables to define the directions of species migration, but it is also necessary to consider the historical data. The rich factual data has been accumulated for the floras of Eastern Europe. Its critical analysis with due regard to contemporary taxonomic studies can help to clear out the specific characteristics of migration and regional florogenetic status of alien species. Unfortunately, the development of retrospective databases is hindered by the inconsistency of the studies. At present it seems possible to develop such bases only for the regions where the collection of data on alien species was started as early as in XIX century. For the sake of the future analysis the regions must be grouped according to their latitude and longitude. In Europe such model regions are: the Leningrad, Tver, Moscow, and Tula regions (the latitude group), and Estonia, the Leningrad and Ivanovo regions (the longitude group). The multifold analysis of the databases is required to put in order the chronological dynamics of florogenetic and invasion territorial statuses and to define the main trends. The task of modeling alien flora genesis can be successfully solved only on a larger scale. The historical analysis of alien floras should be carried out in national and international projects.



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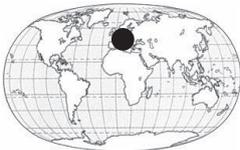


THE EXPANSION OF *ARTEMISIA BIENNIS* IN RZESZÓW

keywords: *Artemisia biennis*, invasive plants, Rzeszów, SE Poland

Artemisia biennis Willd. is probably native to the Rocky Mountains, and other areas of North America. It is an aggressive weed on roadsides and open ground (e.g. empty yards) worldwide. The species was first reported in Poland by Scheuermann in 1956 (railway station Szczecin-Dąbie), and in 1980 Dobrzańska found it on a roadside bank in Mikołów (in Upper Silesia).

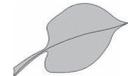
In 1998 *A. biennis* was found in the vicinity of the main square in Rzeszów in a yard where buildings have been recently demolished. In the area of ca. 200 m² around 50 specimens of *A. biennis* grew. In 2000 the species was found near the border of the city of Rzeszów and the village of Przybyszówka. These few specimens grew on rubble. In the following year a few other specimens were recorded on a building site in the vicinity of the dam on the Wisłok (centre of the city). In 2004 three new localities in various parts of Rzeszów were recorded, the largest one composed of 30 individuals. At the moment the species occupies six localities in Rzeszów and in one of them the size of the locality shrank due to the construction of a bar. It seems that the above described expansion is an indicator of the invasion of the species in Poland and in the next years the number localities will dramatically increase, therefore I propose the moving of *A. biennis* from the list of ephemerophytes to hemiagriophytes.



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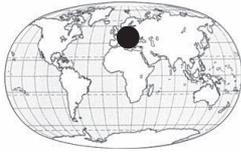
THE NEOPHYTE-FLORA OF AN INNER ALPINE REGION (NORTHERN TYROL, AUSTRIA)

keywords: neophytes, Austria, alpine region

The inner alpine region of Northern Tyrol is located in the Eastern Alps and encompasses an area of 10.600 km² kilometres, whereby less than 10% are beneath 1000 m a.s.l. The central part is enclosed by rather high mountain ranges and there is only one corridor in the northeast, which is open to the alpine foreland (Germany). Therefore, the possibility for alien plants to invade the area is restricted. The only migration path is the Inn-valley, which extends in an east-west direction and shows a gradient of increasing continentality and elevation.

Nevertheless about 550 neophyte taxa of higher plants (*Pteridophytes*, *Gymnosperms* and *Angiosperms*) are recognised in the flora of Northern Tyrol. The total flora consists of about 2350 taxa (including microspecies of *Hieracium*, *Rubus*, *Alchemilla* etc.), i.e., more than 20% of the flora are neophytes. About 100 taxa are considered as established, whereby c. 50% are invasive and 25% are problem plants. Sites of >100 species are currently unknown.

Analysis of the immigration modes show that with the exception of few examples like *Senecio inaequidens*, human intervention is nearly alone responsible for the high number of alien plants. Nearly one third of all species arrived with intentional intervention of humans and includes almost all neophytes that may cause environmental problems. In contrast to this, further distribution in the inner alpine region of Northern Tyrol takes place without (e.g., along streets or railway tracks) or with unintentional intervention of humans (e.g., soil transport), but intentional dissemination by man (e.g., apiculture) is still an important factor for some weeds or transformers.



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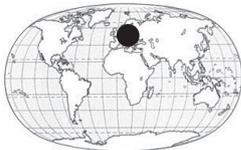
ECOLOGICAL SPECTRUM OF *BROMUS CARINATUS* OCCURRENCE IN KATOWICE TOWN (SILESIA UPLAND, POLAND)

keywords: *Bromus carinatus*, Silesia Upland

Bromus carinatus Hook. & Arn. native to North America is currently expanding all over the territory of Poland and in some other European countries. This neophyte was introduced to Europe as a forage grass. The cultivation of this plant started in Poland in the 60's. *B. carinatus* is presently naturalized in Poland. There are some recent reports about increasing occurrence of this species in various regions of Poland and including semi-natural habitats. In Poland *B. carinatus* is most often recorded in synanthropic habitats: nitrophilous ruderal herbs, segetal communities, grassy roadside communities, trampled communities, urbanised areas and harbours. However, *B. carinatus* is also found in wet meadow communities, forest islands and their edges.

The objectives of this research are to present the habitat spectra of the *B. carinatus* occurrence and its relationship with the forms of spatial utilization recorded in the city and determine the patterns of its distribution in administrative borders of Katowice city. We also attempt to determine group of species that co-occur with *B. carinatus* in various habitats. Numerical ecological methods have been used to analyze the data. The vegetation samples were collected from the following habitats: roadsides, railways, meadows, forests and ruderal sites by using the modified Braun-Blanquet method. The localities of *B. carinatus* were also plotted on maps, on which forms of spatial utilization have been recorded.

Preliminary result of presented study revealed that *B. carinatus* is distributed linearly along roadsides and invade mainly ruderal habitats. The numerical analyses also revealed that investigated grass species co-occur with many meadow species such as *Poa pratensis*, *Arrhenatherum elatius* and ruderal species such as *Artemisia vulgaris* and *Solidago canadensis*.



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REPRODUCTIVE ASSURANCE MECHANISM IN INVASIVE *HERACLEUM MANTEGAZZIANUM*

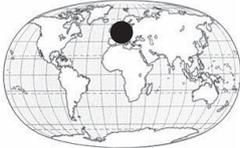
keywords: *Heracleum mantegazzianum*, reproductive assurance, self-pollination, protandry, RGR

Heracleum mantegazzianum (Apiaceae), native to Caucasus, has become a widespread invader across Europe including the Czech Republic. This monocarpic species reproduces exclusively by seed, is self-compatible and has hermaphrodite but protandrous flowers, arranged in compound umbels. The umbels are of four orders and mature in sequence. Reproductive potential of *H. mantegazzianum* is enormous and seems to be a crucial feature of its invasion success.

Observation in an experimental garden and in natural stands in NW Bohemia, Czech Republic, showed that individual flowers are fully protandrous, precluding self-pollination. At the whole plant level, stigmas of higher-order umbels are exposed to cross-pollination for almost entire female phase, but at the end they often overlap with initial male phase of lower order umbels, allowing for geitonogamous pollination if out-crossing has not been realized. Such opportunity for delayed between-flowers self-pollination can ensure seed set of this monocarpic species if sexual partner is not available. Moreover, an overlap between flowers of the same umbel was sometimes observed. At the end of the male flowering period, the presence of several late dehiscing anthers and receptive stigmas overlaps in flowers of the same umbel, which may play role under pollinator limitation.

To verify selfing ability within an umbel without the presence of pollinators, 40 umbels were bagged and produced viable seeds; their mean germination was 54%, and not related to umbel position. Relative growth rate of selfed seedlings was 0.17 g/day, slightly less than RGR of open-pollinated seedlings (0.18 g/day).

H. mantegazzianum has a mating system which provides sufficient opportunity for outcrossing but maintains selfing as a mechanism of reproductive assurance under unsuitable conditions. Such reproductive strategy enables the species to start invasion by a single isolated plant spread by a long-distance dispersal event.



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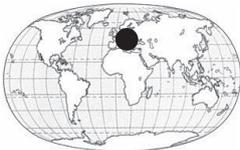
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DOES LANDSCAPE STRUCTURE INFLUENCE INVASIVE PLANT SPECIES DISTRIBUTION?

keywords: landscape structure, habitat selection, Belgium

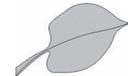
Landscape structure has been proven to affect plant populations distribution and dynamics as rare plant species occurrence in fragmented habitats. Landscape ecology principles have seldom been applied to the biological invasion process. We hypothesised that ecological landscape is a pertinent scale to study factors influencing plant invasions. We studied relationships between the distribution of five of the most invasive plant species (or species complex) in Belgium and the structure of two landscape units (Comblain and Kessel). Selected species were: *Fallopia japonica*/*F. bohemica*, *Heraclium mantegazzianum*, *Impatiens glandulifera*, *Senecio inaequidens*, *Solidago gigantea*/*S. canadensis*. In 2003, each landscape unit was surveyed to localize all target species populations. Landscape composition and structure were interpreted in a GIS (ArcView 30.2). Based on each species population number, *I. glandulifera* exhibited the highest invasive success in both landscapes. Habitat selection indices (SI) indicated that some habitats were more prone to invasion than expected under a random distribution hypothesis and were different between species. Based on the number of habitat selected, *F. japonica* in Comblain and *I. glandulifera* in Kessel exhibited the highest invasive success. The roads, rivers and railways networks influence on the populations distribution was also been tested. In Comblain, 87 % of populations were located under 5 m from these networks instead of 55 % in Kessel, these areas representing 9 % and 15 % of the landscape units area respectively. Landscape structure influence was assessed by logit regressions based on selected habitat patches structural characteristics. Only few tests were significant. We concluded that within-patch micro-habitats probably played a major role in the invasive plants distribution at the landscape level as shown from collected field data.



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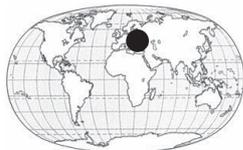
THE PARTICIPATION OF THE INVASIVE ALIEN PLANTS IN THE FLORA OF THE ŁĘDZINY DISTRICT

keywords: Łędziny District, kenophytes

The town and district of Łędziny is situated in the south-eastern part of the Silesian province. The environmental changes made by very intensive development of industry and lack of detailed knowledge of this area had become the basis for the research performed during the years 1999-2001. The purpose of this study was to prepare a list of species and to recognize particular distribution for each species on this area. The comparison of the research results with earlier published information showed that there are some new species, which occurred during the last 20-30 years.

The floristic list includes 580 species of plants which were noted from this area and 497 out of this number are species found during local, own research. The Participation of kenophytes in the all flora was 8,96 %- 52 species. The status of kenophytes was specified on the base of actual list of kenophytes in Poland. 34 species of this group were numbered among the alien invasive plants. 14 species were earlier noted from literature whereas 20 were found for the first time. Among species which were not noted earlier there are species which have only one occurrence and those which are fairly frequent as well. Regarding the species occurrence frequency on this area 10 species were recognized as very rare region, 10 species as rare, 11 species as not frequent and 3 species as frequent. There were no species recognized as very frequent or common. The habitat's group analysis showed the superiority of the species which on ruderal places- 23 species. There is an influence of the way of the Łędziny district arrangement on high ruderal species participation. There is a lot of agricultural areas (62 % of area), industrial structures and barrens. The dominating configuration is one-family dwelling-place. The Presence of some of the species might be explained by the artificial planting near The "Ziemowit" coal mine.

Clear changes which have been observed in the flora of Łędziny over the last 30 years, the growth of the kenophytes participation in the flora give the arguments for the future observation. The next local research and the analysis of the alien invasive plant distribution can provide the possibility of observing the expansion speed of the plants and give information about their habitat preferences.



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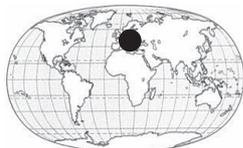
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TENDENCY OF DISTRIBUTION OF *ELAEAGNUS ANGUSTIFOLIA* L. IN NORTHERN BLACK SEA REGION (UKRAINE)

keywords: *Elaeagnus angustifolia*, distribution, ecology, Ukraine

Active dispersal of *Elaeagnus angustifolia* L. is observed in the Northern Black Sea region at the end of the 20th c. The initial centers of its invasion were roadside plantations where this species was widely cultivated. Now *E. angustifolia* spread spontaneously and occurs in the region sporadically, forming more or less large stands consisting of mature and young trees, and seedlings. In man-made habitats it occurs as solitary trees or small groups. In semi-natural habitats it prefers sandy steppes, overgrazed pastures, open sands, high coastal sand dunes, floodplain meadows, steppe and stony slopes of ravines, occurring on dry soils. It penetrates in shrubby and steppe communities. On seaside dunes it forms communities of *Elaeagneta angustifoliae* formation, also occurring in *Hippophaeta rhamnoidis* formations together with *Amorpha fruticosa* and *Tamarix ramosissima*. In coastal ecotopes of the Dnepr and the S. Bug *E. angustifolia* is spreading among willow-poplar floodplain woods of the coastal strip, often together with *Amorpha fruticosa*. However, *E. angustifolia* does not tolerate prolonged flooding, and perishes at higher humidity levels. In steppe habitats this species behaves both as a weed, occupying free sites with disrupted vegetation, and also as a species actively spreading in sandy steppe and open sands. The arboreal level projective cover in these stands ranges from 10 up to 50(-70) %, that of the herbaceous layer, 40-80 %. In such places the number of steppe and psammophilic species decreases; they are replaced by meadow-steppe species; the number of mesophilic species increases. In overgrown vernal pool areas the species is suppressed, and soon perishes. There is a danger of overcompeting of natural steppe communities by this species and replacements of these communities by more mesophilic ones, which can result in degradation of the ecosystem. This work is supported by the State Fund of Fundamental Research of Ukraine.



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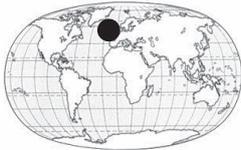


THE CHEMICAL COMPOSITION OF PLANT LITTER OF *ROBINIA PSEUDOACACIA* L. AND ITS ECOLOGICAL ROLE IN SANDY ECOSYSTEMS

keywords: *Robinia pseudoacacia*, invasive tree species, plant litter, nutrient elements, soil formation, sandy soil

Robinia pseudoacacia is a species of North American origin considered in Poland as an invasive plant. It is used for reclamation of sand excavations and other post-industrial sites, most often to advance the process of soil and plant succession. The positive effect of *R. pseudoacacia* on a habitat is primarily connected with the chemical composition of plant litter as well as with the biology of the species.

Samples for investigation were taken from reclaimed areas of Bukowno sand excavation (Southern Poland). Chemical composition of *R. pseudoacacia* litter (green leaves, leaf litter, bark, fine twigs, root) have been researched. By means of AAS after wet mineralization of samples the composition of macroelements (C, N, P, Mg, K, Ca, Na) microelements (Mn, Mo, Co, Fe, Al, Zn, Si, Cd, Sr) and plant litter reaction have been determined. The greatest accumulation of elements has been observed in the following parts: green leaves (Ca >K >Mg >P >S >Na >Fe >Zn >Al >Mn), leaf litter (Ca >K >Mg >Si >Fe >P >Na >Al >Zn >Mn). Similar regularities are observed in the remaining litter of *R. pseudoacacia*. It must be emphasized that nitrogen occurs in similar quantities in particular samples and it varies from 1,01 to 2,65%. The plant litter reaction (pH) vary from acid (bark and fine twigs – 3,6) to weak acid (green leaves and litter – 5,3). After withering the leaf litter becomes the source of nutrient compounds which may be assimilated by plants and to a large extend it modifies the habitat conditions, in particular, it has an influence of the rate of soil forming processes. In a short period of time under the canopy of *R. pseudoacacia* a 10 cm organic and humus horizon (O/A) has developed.



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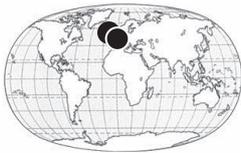
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INUNDATIVE BIOCONTROL OF *AZOLLA FILICULOIDES* USING A SPECIALIST WEEVIL

keywords: Biological Control, *Azolla*, *Stenopelmus rufinasus*

The floating fairy fern, *Azolla filiculoides* is a largely unwelcome invader in the UK and Europe, capable of rapidly smothering still or slow-moving freshwater habitats with a thick vegetative mat which excludes light and oxygen. Small fragments of plant material can establish a new infestation and are often found as contaminants of aquatic plants for sale but can arrive on visiting birds. The same weed became invasive in South Africa where it was soon the subject of a classical biological control programme. As a result of this research the highly-specific American weevil, *Stenopelmus rufinasus*, was released after safety testing, with great success. Remarkably, the same weevil arrived accidentally in the UK as early as 1921 and most probably many times since, but was faced with less favourable climate. This may be the reason it has failed to provide continual sustainable control countrywide. Nonetheless, this naturalised agent has been proven to control and even eradicate relatively large *Azolla* infestations, mirroring performance in our lab studies. Demand for inundative releases is increasing but the challenge remains to convince the user that an early season application at the first sign of the weed is the best way to use this highly effective insect.



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SEEDLING ESTABLISHMENT AND GENETIC DIVERSITY IN A MIXED PLOIDY POPULATION OF *FALLOPIA X BOHEMICA* IN ALSACE

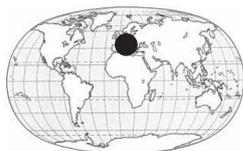
keywords: *Fallopia x bohemica*, ploidy, ecology, seedling establishment, river plain

There are many populations of Japanese Knotweed *s.l.* in the Alsace plain (north-east of France), extending from the Vosges (origin of the introductions) towards the Rhine along the dense network of rivers. In spite of a relatively early introduction (probably at the beginning of the 20th century), the rapid expansion of Japanese knotweed *s.l.* is relatively recent (past few decades). Many factors may be involved: 1) human causes: increase of suitable habitats by continuous forest fragmentation, embankment building, water pollution); deposits of very small portions of rhizomes along rivers or roads; 2) phenotypic plasticity associated with recent genetic diversity.

The aims of the study were first to examine the genetical diversity of populations along a ecological gradient from the Vosges (Fecht; Giessen) to the Rhine; and secondly to study in depth a portion of river where the populations show high variation in morphology and phenology. The study was carried out from 2003 to 2005.

1) Cytology and molecular analyses were performed on 33 samples of Japanese knotweed *s.l.*, mainly along the rivers Fecht and the Giessen, where populations are the most diverse and abundant. Cytologically, the results indicate an unique mix of hexaploids, octoploids and aneuploids. Without the molecular data, it is still not possible to determine whether the distribution of the octoploids is from clonal spread, spontaneous seed germination or a mixture of both processes. The three 2-3 years old seedlings (*F. x bohemica*) found along the Fecht had the following cytological composition: $2n=66$; (? back-cross); $1x2n=88 + b2n=77$ (back-cross); $2n=75$ (back-cross). The following accessions have been examined for chloroplast haplotype using PCR RFLP analysis of the *trnK* intron, and all were found to have the *F. japonica* var. *japonica* haplotype. We are thus increasingly thinking that the most likely origin of the $8x$ is from an unreduced gamete from *F. sachalinensis* pollinating an octoploid *F. japonica* var. *japonica*, and these data support this hypothesis for this area of France.

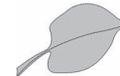
2) Five of the 33 samples from the Fecht river were examined for biological traits, both vegetative (total height; size of the larger leaves; growth rate) and sexual (size and colour of inflorescences; phenology; germination success of clones producing seed). The surface area occupied by each clone was estimated along 150m. The results are currently being analysed but indicate high variations for most of these traits.



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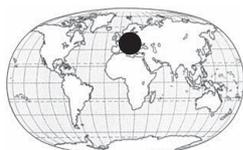
A 24



FLORA AND VEGETATION ON WALLS IN SOUTHERN AND WESTERN MORAVIA (CZECH REPUBLIC)

keywords: wall flora, alien species

Walls are specific man-made habitats, typical of human settlements and exposed to strong antropogenous influences. Nevertheless, they provide new ecological niches and can be occupied by different types of synanthropic vegetation. Colonization of walls by vascular plants strongly depends on the availability of diaspores from the surrounding ruderal or semi-natural vegetation types. This study focuses on the wall vegetation in southern and western Moravia, Czech Republic. In total, species composition of 302 plots was recorded on vertical and horizontal wall surfaces in villages, towns and on castle ruins together with the information about local conditions, walls' surroundings and macroclimate. Altogether, 288 species of vascular plants and 39 bryophytes were recorded. Flora of the studied walls included 40 % of alien species. Compared with the representation of alien species on walls reported from other parts of the Czech Republic, this proportion is rather high and results from presence of several garden-escapes, deliberate introductions by man for ornamental purposes and higher annual temperature in the study area. The representation of archaeophytes was 24 % and the most common species were *Chelidonium majus*, *Capsella bursa-pastoris*, *Bromus sterilis*, *Ballota nigra* and *Sonchus oleraceus*. Neophytes made up 16 % of the total species number and the most frequent species were *Conyza canadensis*, *Syringa vulgaris*, *Sisymbrium loeselii*, *Erigeron annuus* and *Sedum spurium*. The ratio of native species, archaeophytes and neophytes was assessed with regard to the wall microhabitats, type of human settlement and altitudinal gradient in the study region. Moreover, the composition of families, life forms, life strategies and dispersal strategies of plants colonizing walls was described. The relationship between species composition and enviromental factors was analyzed with canonical correspondence analysis.



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A 34



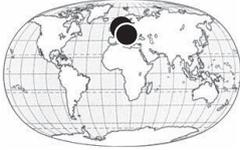
ALIEN SPECIES IN POLAND: AN ONLINE DATABASE

keywords: alien species, invasive species, databases

Collection and dissemination of information on IAS are key elements to help in solving the problems caused by invasions. In 1999, a database on all species introduced in Poland, including animals, plants, fungi was developed at the Institute of Nature Conservation, Polish Academy of Sciences in Cracow. The database was prepared for the Ministry of Environment. In 2003, part of the data was made accessible via the Internet at www.iop.krakow.pl/ias.

Of 575 alien species, currently present in the database, 279 belong to vascular plants. For each species, information on taxonomical position, synonyms, biology, natural distribution and distribution in Poland is compiled, as well as data on the population numbers and trend, invaded habitats, plant communities and impact upon native species. Details on the introduction are also gathered, including time, place, number of introduced individuals and pathway of introduction. For each species, need and methods of control are indicated. The majority of listed species are neophytes i.e. taxa introduced and naturalized after 1500. Only few are casual or archaeophytes (introduced before 1500) which still expand their range.

In future, new alien species will be added to the database and data on the species already included will be updated. The database will be linked to the Nordic-Baltic Network on Invasive Species (NOBANIS) and Global Invasive Species Information Network (GISIN).



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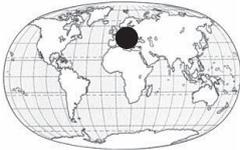
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NOBANIS: NORDIC-BALTIC NETWORK ON INVASIVE SPECIES

keywords: alien species, databases, Nordic-Baltic region

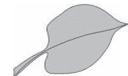
The Nordic/Baltic Network on Invasive Alien Species (NOBANIS) (www.sns.dk/nobanis) will develop a distributed but integrated network of common databases encompassing national and regional specialist databases in the Nordic/Baltic countries. A common portal will facilitate access to the IAS-related data, information and knowledge in the region. NOBANIS will provide a tool for exchanging information on invasive alien species from Greenland to Northern Russia and from Northern Norway to Germany and Poland. NOBANIS will provide administrative tools for making the precautionary approach operational in preventing the unintentional dispersal of invasive alien species and mitigating adverse effects of IAS on biological diversity. NOBANIS will include searchable lists of alien species, a catalogue of experts on alien species, species accounts, species distributions and recommended preventative, eradication and control measures. The lists of introduced species in NOBANIS will be used to identify species that are invasive at present and species that may in the future become invasive. NOBANIS will also provide the foundation for the future development of an early warning system for invasive alien species. It will be possible to extract information from NOBANIS for facts sheets for dissemination to authorities, specialists, the news media and the general public. NOBANIS will establish a network for cooperation between competent authorities of the region and contribute to implementing recommendations from the 6th Conference of Parties of the Convention on Biodiversity's and Recommendation No. 99/2003 of the Bern Convention to establish regional cooperation to aid in eradication, control and mitigation of ecological effects of invasive alien species.



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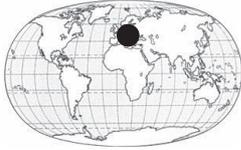


HEMLOCK *CONIUM MACULATUM* L. – AN INTERNATIONALLY INVASIVE POISONOUS PLANT OF EURASIAN ORIGIN: ITS REGIONAL STATUS, PHYTOCOENOLOGICAL SCALE AND SELF-BUILT COMMUNITY IN WIELKOPOLSKA (MIDDLE WEST OF POLAND)

keywords: alien plants, status, *Conium*, plant communities

Conium maculatum is today almost a cosmopolitan plant species showing its high invasiveness in many remote parts of the world (in America, Africa, western Europe and even Australia with New Zealand). Its natural distribution remains still uncertain although the plant is regarded to be of Mediterranean-all-Irano-Turanian origin (Zajac 1987) and in Poland it is considered to be an ancient alien species – the so-called archaeophyte (Mirek et al. 2001). In the large provinces of Wielkopolska and the Western Pomerania the species has been so far regarded as rare (Żukowski, Jackowiak, ed. 1995). In 1999 large phytocoenoses dominated by hemlock were found in two sites near the Poznań agglomeration. The largest and most luxuriant phytocoenoses were found on an industrial waste dump near a potato processing factory, although some well-developed communities were also observed in a typically agricultural landscape. The mentioned communities were subject of observations and phytosociological documentation, supplemented by some data from the Gnieźnieńskie Lakeland. Furthermore, *C. maculatum* has also been repeatedly recorded from various natural plant communities developing in the neighbourhood of the investigated localities.

The author would like to present chosen data and to propose discussion focused on: (1) the floristical structure and (2) syntaxonomical status of the investigated hemlock community, as well as (3) the occurrence and present status of *C. maculatum* in other vegetation types, particularly of natural origin. The results may contribute to general information about contemporary phytocoenological scale and potential invasiveness in Poland of this highly poisonous plant.



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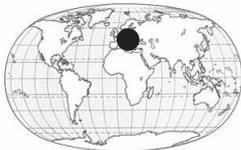


**THE CHARACTERISTIC OF THE ARCHAEOPHYTES APPEARING IN THE AREA
OF THE CEDYNSKI LANDSCAPE PARK (NW POLAND) – DISTRIBUTION, HABITAT CONDITIONS,
THE DEGREE OF NATURALIZATION AND PRESENT THREATS**

keywords: archaeophytes, synantrophization, threatened plants

On the basis of the original field studies made in 1998-2003 and historical data recorded during 149 years of geobotanical investigations carried out in the area of Cedynski Landscape Park 105 species of archaeophytes were found, including mainly segetal (61) and ruderal (41) species.

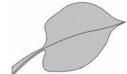
The highest number of archaeophytes appears occasionally on the natural and seminatural habitats (44 species), or do not appear in these habitats at all (19 species), as in the case of *Hordeum murinum* L., *Thlaspi arvense* L. The other archaeophytes are very often associated with these type of habitats (19 species) and 6 species became fully naturalized, like *Carduus crispus* L., *Camelina microcarpa* Andr. subsp. *sylvestris* (Wallr.) Hiitonen. During the research 17 species of archaeophytes, which have been recorded by previous authors, were not found any more, and 35 species of the species (approx. 40%) were considered as rare and very rare.



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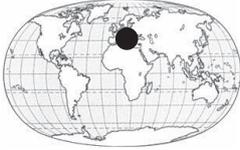
A 8



**THE MORPHOLOGICAL AND ECOLOGICAL CHARACTERISTIC OF INVASIVE PLANT
FROM *SOLIDAGO* L. GENUS**

keywords: expansive neophytes, goldenrods, leaf morphology, epidermis, intergenera variability, SEM

The *Solidago* genus is one of the most complexes among the genera of higher plants. Variability of this genus is still enlarged by hybridization and introgression, due internal properties, additionally influenced by ecological factors. In Central Europe occur naturally five representatives of *Solidago* (goldenrods), but only one species, *S. virgaurea* L. is native in Europe. Other four taxa; *S. canadensis* L. s.l. (var. *canadensis* and var. *scabra*), *S. gigantea* Ait. and *S. graminifolia* (L.) Salisb. are of alien origin. They were introduced into Europe from areas of its original distribution in eastern North America in the 18th century as horticultural plants. In Lower Silesia territory the most often taxons are *S. canadensis* var. *scabra* and *S. gigantea*, *S. canadensis* var. *canadensis* occurs rarer. Actually these species are considered as a dangerous to native vegetation and function of ecosystems of meadows and riversides in Poland. Expensive taxa of genus *Solidago* shows morphological similarity and they taxonomical status in Europe (particularly *S. canadensis* s.l.) is still discussed. To the contrary, *S. graminifolia* doesn't show any evidence of aggressive expansion, area of distribution this species is limited to a single geographical locality in Lower Silesia. The micrometrical features with depressed *Solidago* taxa are: leaf type, hairs on adiaxial epidermis, stomata index of adiaxial epidermis and leaf thickness.



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COMMON RAGWEED (*AMBROSIA ARTEMISIIFOLIA* L.) INVASION IN HUNGARY

keywords: common ragweed (*Ambrosia artemisiifolia*), pollen allergy, invasion, cooperation, raising awareness

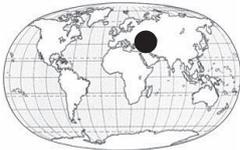
Ambrosia artemisiifolia L. (common ragweed) first appeared in the 1920's in South-West Hungary. The plant started to spread rapidly, and has invaded almost the entire territory of the country becoming the most harmful agricultural weed.

In addition to the detriment of the agricultural income, it also causes serious health problems. Some 20% of the population suffers from the symptoms of allergy, while 80% of them are allergic already to ragweed.

An unprecedented social and political cooperation started when the roots of the problem became widely-known. Politicians, the government, a great number of NGO-s, scientists and people started to organise their own campaigns and actions, including amendments to render even more stringent regulations. However, without harmonisation and cooperation, these were not efficient enough.

In order to increase the efficiency of the actions, Municipality of Budapest and Pest County Council worked out the basis of a wide cooperation, and launched their first joint campaign in 2004. The key objective was to raise the awareness throughout the whole society. Via the media, by organising drawing and ragweed collection competitions both for children and adults (communities), more and more people joined the campaign and started to act. To ease bureaucracy, the two municipalities started to operate a public ragweed hotline for people to report about infected areas, and then to forward the data to the competent authorities.

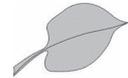
In spite of all the efforts we still have not found a satisfactory solution to stop the invasion of common ragweed.



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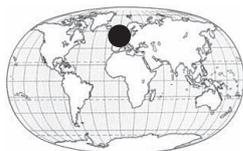
INVESTIGATION ON INVASIVE PLANTS IN ARMENIA

keywords: flora of Armenia, natural ecosystems, invasive plants

The study and control of invasive alien plants are one of the main priorities in nature and biodiversity conservation. At present, data on the spread and distribution of invasive plant species in the territory of the Republic of Armenia, and their impact on agricultural and natural areas are missing.

Armenia is presently crossed by the main route between Iran and Georgia and toward Russia. The deficiency of the State Quarantine Service has much facilitated the entry of new alien plant species in particular along transport routes. These alien species are potential hazards for the conservation of native biodiversity, agriculture and natural ecosystems. In addition, large stocks of crop seeds received as humanitarian assistance were probably contaminated by weeds. Indeed, this is a very well known route of introduction worldwide.

In the last two years we started the study of the recent spread of invasive species and their impact on biodiversity and natural ecosystems with special concern to pastures and hayfields. We focussed our researches on recently invaded areas: border territories and representative areas along the main roads in the country as well as in the surroundings of the main railway stations. Estimates of invasion dates and history will be inferred from our survey and existing herbarium and literature records, so that older, widespread invasions may be discriminated from new, emerging invasions (for which control may be more feasible).



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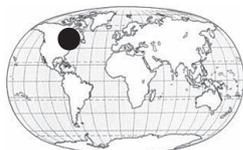
M 33



THE POTENTIAL FOR THE BIOLOGICAL CONTROL OF *IMPATIENS GLANDULIFERA* ROYLE IN THE UK AND EUROPE

keywords: *Impatiens glandulifera*, Himalayan balsam, biocontrol, natural enemy, invasive weeds

Impatiens glandulifera Royle (Himalayan balsam) is invasive in thirteen EU countries and introduced to more than twenty. The weed has successfully invaded almost every riparian system in the UK at a remarkable rate since its introduction as a garden ornamental in 1839. Currently *I. glandulifera* is naturalised in over 50% of the 10 km recording squares of the UK and this, the tallest annual in the country, is able to out-compete the most resilient species due to its vigorous growth rates, large seed banks and prolific, widespread seed dispersal. Where *I. glandulifera* forms monocultures in riparian habitats the effects on the local ecosystem can be severe, including bank erosion, biodiversity loss and increased flooding risk. The environment agency have placed a figure of between £150- £300 million for its eradication in the UK. Current control methods are usually difficult and costly and often not attempted due to the location and sensitivity of the habitat invaded, or the sheer scale of the problem. *I. glandulifera* is native to the Himalayas, from where it arrived without its suite of natural enemies, so it should be amenable to classical biological control. The case is strengthened by the discovery of *Puccinia komarovii*, a natural enemy of *I. parviflora* catching up with its host in Central Europe as reported by EMAPI 6. Herbarium studies indicate similar co-evolved pathogens exist on *I. glandulifera*. Any biological control agent would, as always, need to be highly specific especially due to the presence of the native and scarce *I. noli-tangere* in the UK. This paper examines the distribution and spread of the weed in the UK and Europe, the scale of the problem, control methods, and the potential for its biological control. The likely constraints are also discussed.



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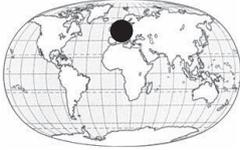
A CANADIAN STRATEGY TO ADDRESS THE THREAT OF INVASIVE ALIEN PLANTS AND PLANT PESTS

keywords: Canada, plant pests

In Canada, as in other countries, invasive alien species have severe and often irreversible impacts on native ecosystems, and cost the forestry and agriculture industries billions of dollars annually. Increases in international trade, travel and other factors have increased the frequency of new species introductions to Canada. This trend is expected to continue in the future.

To protect Canada's plant resources, related industries and natural environments, government and non-government groups from all jurisdictions in Canada have undertaken the development of a national strategy to address invasive alien species. The strategy integrates environmental, economic and sociological considerations into decisions regarding invasive species. It enhances co-ordination and co-operation among partner agencies, strengthens programs to protect natural resources, and maximizes collaboration to ensure that limited resources target highest priority issues.

One of these agencies, the Canadian Food Inspection Agency (CFIA), plays a leading role in protecting Canada's plant resource base. It guards against the entry and spread of plant pests and diseases from foreign countries and works to control or eradicate introduced pests and diseases. These include plants, viruses, fungi, bacteria, mycoplasmas, nematodes, insects, and mites.



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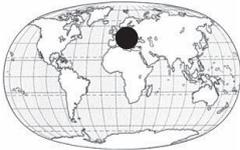
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HYBRIDIZATION AND SEXUAL REPRODUCTION IN THE ALIEN INVASIVE COMPLEX *FALLOPIA* ADANS. (POLYGONACEAE) IN BELGIUM

keywords: *Fallopia*, *Polygonaceae*, floral biology, reproductive success, total seed production, seed rain, seed viability, seed bank, seedlings survival

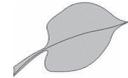
In this paper, we consider the role of the sexual reproduction in the dispersal capacity of the invasive alien complex *Fallopia* Adans (Polygonaceae) in Belgium: *F. japonica*, *F. sachalinensis*, *F. baldschuanica* and hybrids (*F. x bohémica*, *F. x conollyana*). Hybridization in this complex may contribute to the formation of new populations capable of sexual reproduction and backcross with the parent plants and potentially adapted to climatic conditions of their new environment. We followed the different steps of the sexual reproduction including: the floral biology, the reproductive success, the total seed production, the seed rain, the seed bank, and the germination capacity of seeds, seedlings survival. The taxonomic status of adults and seedlings issued from sexual reproduction were assessed by mitotic root tip chromosome counts. The flowering period lasts from August to October. The sterile male character of *F. japonica* is confirmed, clones produce little or not pollen, compared with the hybrids ones. However, in both of them, the number of pollen deposited on the stigma is relatively low and the fructification is weak (about 0,20 %). Nevertheless, there is a significant production of seeds that have a high rate of viability, a capacity of dispersal to more 12 meters around the parent plant and a significant proportion of seedlings that survive outside.



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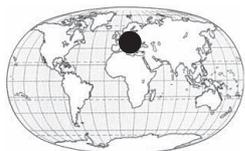


CHANGES IN PLANT SPECIES RICHNESS IN SOME RIPARIAN PLANT COMMUNITIES AS A RESULT OF THEIR COLONISATION BY TAXA OF *REYNOUTRIA* (*FALLOPIA*)

keywords: alien species, *Reynoutria*, floodplain forest, ecological impact

The aim of the study presented was to estimate the type and scale of threat posed by alien plant species with regard to native biological diversity, especially in view of the fact that these problems have hitherto rarely been addressed in Poland. The studies were carried out using the example of *Reynoutria* (*Fallopia*) species which are considered to be invasive in our country as well as in other regions of Europe and of the world. This is an attempt to determine the impact of these plants on the composition and diversity of natural components of the herb layer in floodplain forests in the example of fragments of valleys of the Soła, Biała and Jasienica rivers in the southern part of Poland. Investigations were performed on permanent study plots (20m x 20m) localised in patches of floodplain forest.

The composition and diversity of species in the floodplain forest herb layer was found to be dependent on the extent to which the investigated plot was covered by knotweed shoots. The results of these field studies have confirmed the hypothesis that *Reynoutria* species exert a negative influence on the native components of floodplain forest herb layers. This impact is, however, different for various life forms and ecological habitat groups of plants. Increases in the proportion of the surface covered by knotweeds does not significantly influence the development of early spring geophytes which are able to go through their full life cycle. In the case of this ecological group, a decrease in coverage coefficient can only be seen in plots with a massive occurrence of knotweeds. The following species are able to compete successfully with knotweeds even if these plants are present at a high coverage coefficient: *Aegopodium podagraria*, *Urtica dioica* (rhizomatous perennials with similar modes of growth), balsams: *Impatiens parviflora* and *I. glandulifera* (alien annuals with an R-type life strategy) and *Calystegia sepium* (a creeper).



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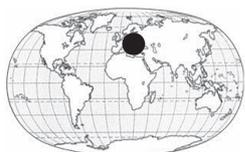
REGIONAL SCALE ASSESSMENT OF ALIEN PLANT INVASIONS: A CASE STUDY FOR THE SILESIAN UPLAND (SOUTHERN POLAND)

keywords: evaluation, criteria, threatened natural habitats, Upper Silesia, Poland

The aim of this study is to compile a list of alien invasive species occurring in the Silesian Upland with an estimation of their status in the region and with special attention to those species which have the largest share in transformations of natural and semi-natural plant communities.

From the total number of 460 alien species considered to be naturalised in the Polish flora, 336 species which occur in the Silesian Upland have been subjected to analysis. For subsequent selection and estimation of the threat posed by these species, the following criteria have been adopted: number of localities in the region, population size (abundance) in each locality, invasion rate, occupied biotopes. Detailed evaluation has been carried out with regard to the group of species which infiltrate natural and semi-natural plant communities. Necessary data for estimation of the degree of invasiveness for these species have been collected during field studies conducted in Silesian Upland in the years 1990-2004 (species mapping in a grid of 2 x 2 km²). Phytosociological relevés have also been carried out in communities with a large share of species that most seriously threaten the native plant cover.

The regional list of invasive plants includes 123 species. Within this group, 61 species have been characterised as "non-harmful", 22 as "weeds", and 40 as "transformers". 14 species belonging to the group of "transformers" which are characterised by exceptional competitive abilities have been selected as most important with regard to the threat they pose to native flora and vegetation. The following species pose the most serious threat to the native flora: *Impatiens parviflora*, *Heracleum sosnovskii*, *Solidago canadensis*, *S. gigantea*, *Reynoutria japonica*, *R. sachalinensis*, *R. x bohemica*, *Quercus rubra*, *Padus serotina*, *Bidens frondosa*, *Aster novi-belgii*, *Echinocystis lobata*, *Acer negundo* and *Robinia pseudoacacia*. The obtained results will form a basis for future multi-faceted studies on alien invasive species in this region as well as for practical actions.



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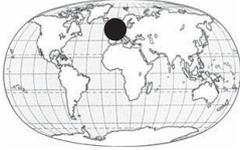
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STRATEGY AND BEHAVIOR OF ALIEN SPECIES IN INDUSTRIAL REGION

keywords: alien flora, anthropogenic habitats

It has been determined that all the stream of alien species going to the south east of Ukraine, being distributed in technogenous ecotopes, is differentiated by some basic groups of ecotopes according to the degree of species anthropotolerance and ecologic capacity of ecotope. By means of multidimensional statistics methods it has been ascertained that adventive fractions of technogenous ecotope floras form in a factor space three separate groups which are formed in: non-toxic primary and secondary technogenous ecotopes; toxic secondary ecotopes (by-product coke industry, chemical, metallurgical works); toxic primary ecotopes (ash-, slag and sludge dumps, ferromanganese dumps, zirconium quarries). Special investigations of the differences among the adventive fractions groups testify that spontaneous separation of all migrating species into various groups in factor space is explained by the fact that they are colonizing technogenous ecotopes of different degree of anthropogenic transformation and in result they have different anthropogenous tolerance. Under the increase of anthropogenic impact in technogenous ecotope, there is observed the increased number of annual plants, xeromesophytes, terophytes from holarctic, pluriregional or Euroasian range types, North American, Mediterranean or Asian species from Asteraceae and Chenopodiaceae families in adventive fractions of floras.



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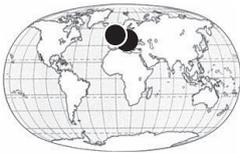
A 35



ALIEN PLANTS IN THE FLORA OF THE UK BLACK COUNTRY

keywords: industrialisation; spatial distribution; urban flora

For the last seven years we have been recording the vascular plant flora of the 700 km squares which make up the old industrial area of the UK West Midlands. This includes the cities of Birmingham and Wolverhampton and the Boroughs of Walsall, Sandwell and Dudley, some areas of which have had a history of industrialisation spanning more than 200 years. We will present distribution data for a range of species and discuss spatial and temporal patterns in the alien flora.



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A 28



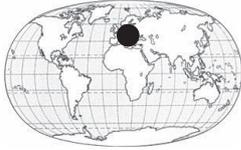
DO ALIEN PLANTS REALLY PREFER POST-INDUSTRIAL WASTE SITES?

keywords: post-industrial waste sites, neophyte establishment

The invasion of habitats by non-native species is a global phenomenon. Most alien plants are considered to be pioneer species that colonise urban-industrial disturbed areas.

Long-term investigations on post-industrial waste sites have in part focused on the quantitative and qualitative characteristics of the neophytes which are able to establish on the sites studied and their environmental requirements. Floristic data were collected by preparing plant lists for each of 137 coal mine water sedimentation pools and 100 coal spoil heaps. Site substrate samples were also collected and analysed to determine the site conditions in which the neophytes had established. Lists of the most frequent neophytes will be presented in the paper together with data about their frequency, abundance and localities.

The preliminary results show that for the coal mine water sedimentation pools neophytes made up less than 25% of the whole flora (453 species). Neophytes constituted 12% of the whole of the flora of the coal mine heaps (581 species). Supporting data is drawn from the literature, including investigations of the flora of a brown coal excavation and Solvay process slurry tips. It is concluded that the floras of many post-industrial sites include a smaller proportion of neophytes than characterise the regional floras as a whole and that the extreme conditions which prevail appear to favour native species.



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STRUCTURE AND CHARACTERISTICS OF THE RECENT ALIEN FLORA AT REGIONAL SCALE: THE EXAMPLE OF THE KRAKÓW-CZĘSTOCHOWA UPLAND (SOUTHERN POLAND)

keywords: alien flora, regional scale, Poland

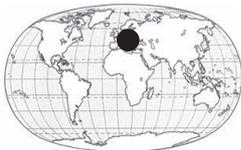
Recent alien flora (neophytes, newcomers) was a subject of studies conducted during the years 1997-2004 in the Kraków-Częstochowa Upland, situated in southern Poland. Total number of recorded species amount to 152, including mostly adventive species, several taxa of anthropogenic origin (e.g. species from genus *Oenothera*), and some species of uncertain origin. Flora of newcomers is much diversified. The species differ in origin, frequency, ability of spread and range of ecological tolerance. Based on above-mentioned criteria they were divided into 3 groups:

1. Plants which do not tend to spread further. These are species introduced by man, mostly of anthropogenic or unknown origin.
2. Species expanding their range and abundance but only limited to man-made habitats.
3. Invasive plants, entering semi- and natural biotopes. These species are capable to exclude native elements of flora, what leads to changes in structure of plant communities.

On the basis of distribution of the studied species in the Kraków-Częstochowa Upland it is concluded that they occur the most abundantly in vicinities of large towns and along transport routes (highways, railways). Statistical analyses of frequency and tendency to occurrence in particular habitats by aliens and of their traits reveal some significant relationships. More invasive alien plants seem to occur in less lit places. They also prefer colder conditions and show calcareous/nitrogen input gradient compared to less invasive plants. The species which are more often to be found in natural and semi-natural habitats also belong to the group of the most frequent plants. Only few species, compared to whole newcomers flora, invade natural plant communities in protected areas i.e. nature reserves and landscape parks. Despite this, species as *Impatiens parviflora*, *Solidago canadensis* or *S. gigantea* are serious threat to native biodiversity.

The study was partially supported by KBN, no. project 3 P04 G 093 25 and 6 P04 G 052 19

(Urbisz A. 2004. Synopsis of the vascular plant flora of the Kraków-Częstochowa Upland. Uniwersytet Śląski. Katowice, Poland, pp. 285)



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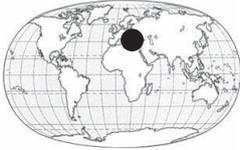
A 5



EXPANSION OF *IMPATIENS GLANDULIFERA* ROYLE ON THE AREA SURROUNDING THE BABIA GÓRA NATIONAL PARK

keywords: *Impatiens glandulifera*, expansion, Babia Góra

The first localities of *Impatiens glandulifera* from neighbouring area were published in the sixties of the previous century. They were localized in Porąbka and Żywiec (Żywiecka Basin) and also Sucha Beskidzka (vale of Skawa river). Near the Babia Góra massif, *Impatiens* became very popular species of cultivated plant. The way of its propagation, migration pace and habitat requirements caused expansion on the area surrounding the Babia Góra National Park. In 2004 season there were observed over 50 stands of this species. 50 % of them are localized on natural and seminatural habitats (alluvia of streams, tall herbs, meadows) the rest, on synanthropic habitats (roadside thicket). Moreover it was stated that it is cultivated, around the Babia Góra massif, in about 100 domestic gardens, which have been still main source of the expansion. The highest locality is on the southern side of the massif (769 m a. s. l., Zubrzyca Góra). The locality nearest the border of the Babia Góra National Park is in Zawoja Markowa (730 m a. s. l., northern slopes). The most frequently *Impatiens glandulifera* occurs in groups of 10–150 specimens in *Phalarido-Petasitetum hybridi*, *Chaerophylletum aromatici*, *Petasitetum kablikiani* and *Alnetum incanae* phytocoenoses.



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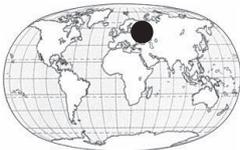
A 18



INVASIVE AND POTENTIALLY INVASIVE PLANTS IN BALKAN PART OF SERBIA

keywords: Serbia, Balkan part, invasive plants

Most of Serbian territory belongs to Balkans area, which is separated from Pannonian part (Vojvodina) by rivers Sava and Danube. For a long time it was believed that Vojvodina due to its position, absence of relief barriers and agricultural character, is predestined for the immigration and further spread of adventive plants, while the further spread toward south is stopped or impeded by Sava and Danube and the hilly-mountain massifs of Balkan part. Due to misconception that adventive plants are primarily weeds or ruderal plants, their spread in the Balkan part of Serbia has for a long time been poorly documented. The new data, particularly regarding the invasive plants, show that above-mentioned estimations were groundless. Certain weed invasive species (*Ambrosia artemisiifolia*, *Iva xanthifolia*) which were for a long time known only for Vojvodina, presently in the Balkan part form thick stands in the ruderal habitats along roads, and are also recorded in many places with the cultivated species. The group of invasive and potentially invasive weeds also includes *Conyza canadensis*, *Erigeron annuus*, *Xanthium spinosum*, *Amaranthus retroflexus*. Primarily grown as decorative plants, *Helianthus decapetalus* and *H. rigidus*, long known for the ruderal habitats, in recent years show a tendency of invasive spontaneous spreading. The special threat for the region are those invasive species (*Ailanthus altissima*, *Amorpha fruticosa*) which from the anthropogenous habitats spontaneously spread to habitats of autochthonous vegetation threatening the natural diversity of flora and the plant communities structure. The recent arrival in Serbia of *Reynoutria japonica* deserves a special attention concerning the data on invasive spreading in neighboring regions. The report will show the results of floristic, classification and chorological analysis, distribution and ecology, as well as the estimate of further behavior of invasive and potentially invasive species in the Balkan part of Serbia.



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M 49



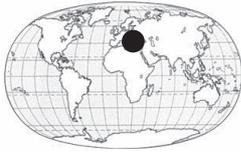
MICROEVOLUTION PATTERNS IN INVASIVE SPECIES

keywords: microevolution, *Conyza*, *Galinsoga*, *Impatiens*, *Echinocystis*, *Bidens*

Microevolution of the most widespread European invasive species was studied - *Acorus calamus*, *Amaranthus albus*, *Ribes aureum*, *Aronia melanocarpa*, *Acer negundo*, *Impatiens glandulifera*, *I. parviflora*, *Epilobium adenocaulon*, *E. rubescens*, *Echinocystis lobata*, *Bidens frondosa*, *Conyza canadensis*, *Chamomilla suaveolens*, *Galinsoga parviflora* and *G. quadriradiata*. An important common pattern for all those species was established: a broad genotype reaction's norm, caused by their native distribution range out of the ecological optimum zone.

A type of propagation does not influence a naturalization potential, e.g. successful invaders are *Acorus* (vegetative propagation), as well as the cross-pollinators *A. negundo*, *C. canadensis* and the self-pollinator *Galinsoga*. In contrary, a type of propagation determines an adaptation mechanism: in cross-pollinators the adaptation pattern is represented by genes recombination and following natural selection; in self-pollinators and apomicts micromutation of physiological characters (those further stay intact in pure lines) starts already at initial population stage and results in broadening of the reaction's norm. Thus, two types of natural selection are demonstrated – moving selection in the first case and stabilizing selection in the second. Cross-pollinators during naturalization invent and then genetically fix the most important adaptive characters, like shorter growth period and faster complete development cycle in gradient from South to North. According to the same gradient *C. canadensis* records a reasonable growth of winter forms percentage in populations and *A. negundo* demonstrates increasing of seeds' hardiness and resting period. Long-day plants are influenced mainly by temperature and precipitation, short-day ones – by a day length.

In contrary, self-pollinators, apomicts and vegetatively propagated species demonstrate a relative stability of bio-morphological characters within the secondary distribution ranges. Variability of growth and developments cycles is either not present or has a chaotic, inter-populations character with no clines. This phenomenon could be explained in the following way: a selection of eurytolerant lines and clones is taking place at the earliest naturalization stages and those lines remain genetically stable (almost unchanged) ever since.



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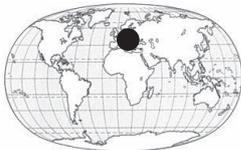
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TOP TEN INVASIVE SPECIES IN THE BULGARIAN FLORA

keywords: Bulgaria, invasive species, vascular plants

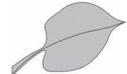
The Bulgarian flora comprises some 3900 vascular plant species including the neophytes. Until recently alien and invasive species have not received any particular attention. However, at the end of 2004 the Ministry of Environment and Waters funded two projects: 1) on the invasive plants and fungi and 2) on the invasive animals. The overall goal of the invasive plant project is to make an inventory of the alien and invasive plants and fungi in the country as well as strengthen the scientific basis for elaboration of a national strategy on the invasive species. The poster presents the mid-term results for ten invasive alien plants in Bulgaria among which are *Ailanthus altissima*, *Ambrosia artemisiifolia*, *Bidens frondosa*, *Conyza canadensis*, *Galinsoga parviflora*, *Impatiens glandulifera* and *Reynoutria bohemica*. Data about the paths and means of entering the country and further spreading are presented. Also, the research needs and future steps in the prevention and control of the invasive plants in Bulgaria are discussed.



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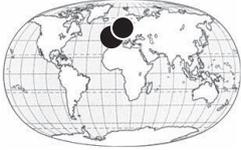
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***HERACLEUM SOSNOWSKYI* MANDEN AND *H. MANTEGAZZIANUM* SOMMIER & LEVIER IN THE AREA OF SUB TATRA TROUGH (SOUTHERN POLAND)**

keywords: *Heracleum sosnowskyi*, *H. mantegazzianum*, Sub Tatra Trough

Heracleum sosnowskyi Manden is a species of Asiatic origin, introduced to Poland as a fodder plant. It is herb plant, characterized by fast growth of biomass and presence of substances of photo-allergic reactions (Błazek 1969, Lutyńska 1974, Kohlmünzer 2003, Jędrzejko, Walusiak 2004). The acclimatization and experimental studies on *H. sosnowskyi*, as a fodder plant, were conducted in 1970s in Chair of Pasture Plants, Institute of Plants Cultivation and Acclimatization in Gubałówka (Zakopane). Despite promising results of these investigations (Lutyńska 1980) regular cultivation of this plant never became popular in Poland. After cessation of the cultivation in Gubałówka the species quickly spread within the area of Sub Tatra Trough. Its main migration pathways are watercourses. At the river and streams banks there are favorable habitats for its development. It was observed that within borders of Zakopane town Giant Hogweed grows abundantly along river Zakopianka but more numerous populations are at further sections of the river. The second Giant hogweed species, native of Asia, is *Heracleum mantegazzianum* Sommier & Levier which colonizes more frequently natural habitats in the study area in recent years. This is similar plant in the structure and traits to *H. sosnowskyi* but differing in leaves margins. It was probably introduced as an ornamental plant to gardens and further it escaped from cultivation sites to natural habitats. Both mentioned species of *Heracleum* are strongly invasive (highly competitive) in the colonized habitats. Thanks to shoot competition they limit growth of other plants, especially native species of smaller sizes. Huge shoots and leaves hamper influx of sunlight to herb and moss layers. Also root competition, for water and nutrients, is of considerable importance. The study was supported by KBN, no. project 2PO4G 02527



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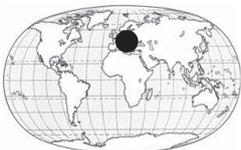
M 6



COMPETITIVE BALANCE BETWEEN THE ALIEN INVASIVE *ACACIA LONGIFOLIA* AND NATIVE MEDITERRANEAN SPECIES

keywords: alien invasive *Acacia*, competition experiment, coastal dunes, seedlings

Non-native species like *Acacia* spp. have been introduced in Portugal at the beginning of the last century with the aim to stabilize sand dunes. However, these species became invasive in some areas, reducing native species density and biodiversity and causing serious ecological problems. In spite of the high seed rain and germination rate, seedling survival of the invasive species is low, especially in the arid south coast, where successful establishment is restricted to nursery plants. We explored the hypothesis of a shift in competitive balances among the invasive and native species at different developmental stages. This hypothesis was explored in a competition experiment of seedling of the invasive *Acacia longifolia* versus the indigenous Mediterranean dune species *Halimium halimifolium* and *Pinus pinea* during early seedling stage and among established plants. Competitiveness was tested using an additive experimental design in combination with ¹⁵N labelling experiment. The major competitive advantage of *A. longifolia* was its constitutive high shoot elongation rate and its effective nutrient acquisition. Established *A. longifolia* plants were highly competitive and tolerant against competition from native species. However, during early seedling stage, *A. longifolia* was less competitive and sensitive towards competitions of the native *H. halimifolium*. We argue that this susceptibility together with drought sensitivity may restrict the spread of the invasive *A. longifolia* under less favourable environmental conditions (e.g. in the South).



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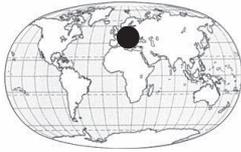
A 37



ALIEN SPECIES IN VASCULAR FLORA OF SMALL RIVERS IN WEST POMERANIA LAKELAND

keywords: alien species, small rivers, NW Poland

Human activity can change local flora significantly. Rare local species disappear, and new alien species come in their place. The most exposed to these changes are riverside carrs, communities of an open character that can easily be invaded by allochthonous elements. The river serves as an effective transport pathway for their diaspores. Therefore, the aim of this study was to draw the most comprehensive list of alien species in some rivers in the West Pomerania Lakeland and present their spatial distribution in the area. I tried to determine how invasive the alien species are and to find the possible routes of migration. The study covered four rivers: Ina, Pężinka, Krępa and Płoń. I have used also the results from floristic studies carried out between 1998 and 2002. The field studies were carried out using ATPOL cartogram grid. The cartograms show the present state of alien species distribution in the selected little rivers of the West Pomeranian Lakeland and the possible directions of their expansion.



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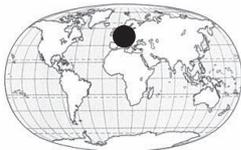
A 27



ANTHROPOPHYTES IN THE VASCULAR FLORA OF THE SELECTED NATURE RESERVES OF THE SILESIAN PROVINCE

keywords: Silesian Province, antopophytes, nature reserves

Plant resources protected in 61 nature reserves of the Silesian Province are influenced by anthropopressure. Human activity results in synanthropisation of the flora. One of the symptoms of this negative process is the penetration of protected forest communities by anthropophytes. This study was an attempt at assessing the frequency of anthropophytes occurring within 7 nature reserves of different anthropopressure intensity. As a result of floristic investigation and on the basis of published information, a total of 37 species of anthropophytes were identified within these nature reserves. Among alien species, kenophytes were the most numerous group (22 species). Archaeophytes (10 species) were less numerous. With regard to diaphytes, i.e. new arrivals not established permanently within the Silesian Province, only one ephemerophyte and four ergasiophytes were noted. For each examined nature reserve, two floristic indices were calculated in order to assess the contribution of alien plants to their floras: total flora anthropophytisation index and permanent flora anthropophytisation index. The values of these indices were highest in the nature reserves situated within cities, near housing estates and transport routes. Thus, in Katowice they reached 10.9 and 9.33 in Las Murckowski and 7.22 and 6.85 in Ochojec, while in Segiet Nature Reserve in Bytom – 7.08 and 7.08. The lowest values were recorded in Zadni Gaj Nature Reserve (2.62 and 2.62) and in Kopce Nature Reserve (1.58 and 1.58). The most invasive alien plant is *Impatiens parviflora*, which was frequent in all investigated nature reserves. This species was found not only along forest roads and paths, but also on the edges of nature reserves and in ruderal habitats. Furthermore, this anthropophyte was noted frequently and abundantly in typical forest habitats, where it caused a decrease in the number of native species of the herb layer.



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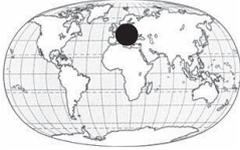
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HOMOGENIZATION EFFECTS ON A PLANT-FUNCTIONAL SCALE

keywords: biotic homogenization, functional traits, invasions

As one of the most important results of plant invasions, biotic homogenization, the replacement of local biotas by nonindigenous and locally expanding species, will increase in the next years. Almost all of the conducted studies related to this issue, focused on species. Due to this fact our approach was to focus on plant traits to determine functional traits, which are influenced by biotic homogenization. With the help of different data-bases we analysed changes in functional diversity of continental and regional floras. The poster represents first results of these statistical analyses.



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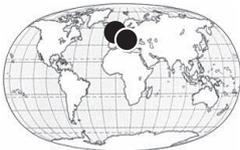


ANTHROPOPHYTES IN THE FLORA OF SELECTED LIMESTONE HILLS IN THE REGION OF PODLESICE IN THE CZESTOCHOWA UPLANDS

keywords: limestone hills, anthropophytes, Czestochowa Upland

Attractive landscape and natural assets of the area around Podlesice are the reason of launching research in this region. The village of Podlesice, which belongs to the Kroczyce district is situated in the Czestochowa Uplands. This area is characterized by numerous limestone hills forming ranges and rock groups, including the Kroczyckie, Rzedkowickie, Morskie and Podlesickie Rocks, all of which stand out from the landscape. Great site mosaic is conditioned by various geological structure and surface features, which is reflected by the great number of plant community types. Therefore beech woods,

dry-ground forests, pine woods, thermophilous thicket and xerothermic grass can be found here. The aim of the research was to inventory the vascular plants in the rock groups of the Rzedkowickie, Morskie and Kroczyckie Rocks. Particular attention was given to rare and synanthropic species because of anthropic pressure which has been growing locally in recent years. Among the 415 vascular plants species which have been listed there are a lot of rare plants, e.g. 64 taxa listed in the Upper Silesia Vascular Plants Red List and 33 protected species. At present man influences in the studied stands comprises rock climbing, tracking, camping and related activities such as lighting of fires and littering. Such activities result in the appearance of synanthropic species. Nearby ploughlands have also influenced the flora. The share of anthropophytes in the flora of these hills is about 13%, archeophytes being the most numerous among them (7 %). Newcomers comprise also species which are planted in nearby gardens for aesthetic reasons, which find a new home in seminatural and natural communities, e.g. *Echinops sphaerocephalus*, *Solidago canadensis*.



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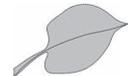
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THE ESTABLISHMENT OF NEOPHYTES IN FORESTS ON NATURAL (NON-ANTHROPOGENIC) AND ANTHROPOGENIC HABITATS (UPPER SILESIA POLAND)

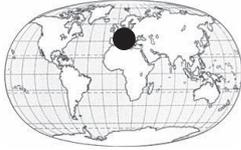
keywords: woodlands, forest, *Quercus rubra*, *Padus serotina*, *Robinia pseudoacacia*

The neophyte establishment phase is crucial in the process of the invasion into forest communities. It might be expected that there will be a difference between neophyte establishment in managed forests on natural (non-anthropogenic) and anthropogenic habitats.

This study examines mixed forest vegetation from natural habitats and from an anthropogenic habitat type, coal mine spoil heaps. The vegetation samples have been collected using the Braun-Blanquet method. From coal mine spoil heaps, 98 relevés were collected from tree stands which have been classified as being strongly transformed mixed forests. The relevés (106) from managed forests on natural, non-anthropogenic, habitats were obtained from the literature.

The study addresses the following questions: do the same species invade the two groups of forests; which of the neophyte species are the most frequent; do they occur with the same abundance in all forest layers and does the tree cover influence neophyte number and abundance in the bush and herb layer?

Preliminary results show that there were 16 neophyte species present in the vegetation on the coal mine spoil heaps. The most frequent, abundant and present in the tree, shrub and herb layers were: *Quercus rubra*, *Robinia pseudoacacia* and *Padus serotina*. In the forests of non-anthropogenic natural habitats only 7 of the 16 neophyte species recorded from the coal mine spoil heaps were recorded. None of them was frequent, however three neophytes were recorded both in the shrub and herb layers: *Quercus rubra*, *Robinia pseudoacacia* and *Padus serotina*.



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AFLPS TO ASSESS THE STATUS OF *POPULUS ALBA* L. OF SARDINIA

keywords: AFLP, *Populus alba* L., Sardinia, assessing origin status

Populus alba L. is a common species of central-European and Mediterranean riparian forest. Molecular analysis demonstrated a high level of genetic variability and the presence of hybrid individuals in Northern Italy. On the basis of these results and on recent evidences of the indigenous status in the western Mediterranean, we extended the survey to the spontaneous populations of *P. alba* present in the island of Sardinia (Italy), whose origin is still a subject for discussion. A total of 105 trees were sampled in 2003 in natural and semi-natural habitat types, over a large area located in the North-West of Sardinia. DNA was purified from apical shoots and AFLP analysis was performed using three primer pair combinations. Geographic coordinates of the sampled trees, collection site features and AFLP profiles were stored on a GIS system for further geographical visualisation and GLM analysis of the data. The AFLP analysis originated a wide array of reproducible and informative DNA bands, however only three different fingerprintings, geographically clustered, were observed among the 105 assayed trees. The lack of paleobotanical evidences of an ancient presence of *P. alba* in Sardinia, together with AFLP results raise the question about the origin status of this taxon. AFLP and geographical analyses would suggest that the spontaneous population of white poplar of the North-West of Sardinia has been originated by vegetative propagation from only three ancestor genotypes. Several hypotheses on the origin of the Sardinian white poplar can be drawn. Our molecular data, at present, cannot confirm or refuse any of the hypotheses, therefore a deeply survey at molecular level of *P. alba* populations present in the Mediterranean basin is necessary to track the origins of Sardinian white poplar. To this end, since 2004, we started a second collection campaign on South Sardinia and on other islands and sites of the Mediterranean basin.

