Joint ESENIAS and DIAS Scientific Conference and 8th ESENIAS Workshop

Management and sharing of IAS data to support knowledge-based decision making at regional level

26-28 September 2018
BUCHAREST, ROMANIA

Book of Abstracts

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2018

JOINT ESENIAS AND DIAS SCIENTIFIC CONFERENCE AND 8TH ESENIAS WORKSHOP

MANAGEMENT AND SHARING OF IAS DATA TO SUPPORT KNOWLEDGE-BASED DECISION MAKING AT REGIONAL LEVEL

26-28 SEPTEMBER 2018
BUCHAREST, ROMANIA

ORGANISED BY:

Research Institute of the University of Bucharest (**ICUB**),
Faculty of Biology (**FB**)
and Botanic Garden „D. Brandza" (**GBDB**) of the University of Bucharest (**UB**)

East And South European Network for
Invasive Alien Species (**ESENIAS**)

Danube Region Invasive Alien Species Network (**DIAS**)

IN COLLABORATION WITH:

Institute of Biodiversity and Ecosystem Research,
Bulgarian Academy of Sciences (**IBER-BAS**)

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EDITORS:

Paulina Anastasiu
Teodora Trichkova
Ahmet Uludağ
Rumen Tomov

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CONFERENCE OVERVIEW

Networking and cooperation on invasive alien species (IAS) in different scales is crucial for the collection, harmonisation, standardisation, management and sharing of sufficient, high-quality and up-to-date scientific information. Recently, several joint research projects have been implemented in order to collect and analyse IAS data at regional level. The largest project conducted by the ESENIAS countries is the **ESENIAS-TOOLS project: East and South European Network for Invasive Alien Species – A tool to support the management of alien species in Bulgaria** (2015-2017). This project aimed at networking and development of IAS tools to support the management of alien species in Bulgaria and in the overall region. Some of the outcomes of the ESENIAS-TOOLS project include: compilation of lists of alien species; collection of data on alien marine, freshwater and terrestrial plants, fungi and animal species; and prioritisation of species and preparation of lists of priority species for the ESENIAS region. The project '**Potential threats to environmental and economic sustainability in the Danube and Black Sea Region: Danube River as invasive alien species corridor'** has been conducted since 2012, by the IBER-BAS, and supported by the International Association of Danube Research (IAD), ESENIAS, and recently by DIAS. Another DIAS project was implemented in the period 2016-2017: **Pilot-study (data collection) on invasive alien species in the Danube Region with a smartphone application developed by the Joint Research Centre (JRC) (Danube-IASapp project)**. The practical use of the smartphone application was tested by gathering of data on invasive alien species of EU concern to assist in monitoring and early detection of IAS in the Danube River basin. The achieved results and data within these projects will be further analysed and managed by the newly developed tools, and thus, will contribute to implementation of the existing IAS instruments and development of the Danube Region IAS strategy and workplan.

This conference entitled *'Management and sharing of IAS data to support knowledge-based decision making at regional level'* is the second conference organised jointly by the ESENIAS and DIAS. The conference aims at:

- Presentation of research results from the recent ESENIAS and DIAS project activities
- Sharing of results and information on other IAS related initiatives carried out in the region, such as national and local monitoring programmes, risk assessments, pathway analyses and action plans, control and eradication projects, management plans and national strategies, citizens activities and responsibilities, data planning and management
- Networking and cooperation among scientists in the ESENIAS and DIAS regions and with other networks and projects in Europe.

SCIENTIFIC TOPICS

1. **Invasive alien species traits and trends** – invasive alien species introductions and spread, biological and ecological characteristics; characteristics of recipient environment; invasive alien species and climate change;
2. **Vectors and pathways for invasive alien species introductions** – analysis, prioritisation, action plans;
3. **The Danube River as invasive alien species corridor** – priority species for the Danube Region, impact on threatened species, specificity of biological invasions in Lower, Middle and Upper Danube River sections;
4. **Invasive alien species impact** – impact on biodiversity and ecosystem services, socioeconomic impact and impact on human health; pests and pathogens;
5. **Invasive alien species prevention and management** – early detection and rapid eradication, surveillance systems; risk assessment and horizon scanning; control measures; restoration of damaged ecosystems; education, citizen science, strategies, policy and legislation;
6. **Management and sharing of IAS data** – IAS networks and information systems, databases, data planning and management;
7. **Other topics**.

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PROGRAMME

26TH OF SEPTEMBER, 2018

CONFERENCE VENUE:
"D. Brandza" Amphitheatre,
Faculty of Biology, University of Bucharest
1-3 Portocalelor Entrance, Sector 6, Bucharest, Romania

08:30 – 9:30 **Registration**

SESSION 1: OPENING SESSION AND KEYNOTE PRESENTATIONS
Chairs: Paulina Anastasiu, Rumen Tomov

09:30 – 10:00 **Opening**
Prof. Dr. Laurenţiu Leuştean – ICUB
Prof. Dr. Carmen Chifiriuc – ICUB
Representative of the Ministry of Environment
Representative of the Romanian Academy
Dr. Teodora Trichkova – ESENIAS and DIAS
Prof. Dr. Ahmet Uludağ – ESENIAS

KEYNOTE PRESENTATION 1

10:00 – 10:30 **Teodora Trichkova, Rumen Tomov, Ahmet Uludağ, Vladimir Vladimirov, Alexander Kotsev, Florian Ballnus** – ESENIAS and DIAS networks: Collection, management and sharing of IAS data to support knowledge-based decision making at regional level

KEYNOTE PRESENTATION 2

10:30 – 11:00 **Konstantinos Tsiamis, Eugenio Gervasini, Sven Schade, Irena Mitton, Fabiano A. Spinelli, Roberto Sgnaolin, Ana Cristina Cardoso** – Invasive Alien Species Smart App: preliminary results of citizens' records

11:00 – 11:30 **Coffee & tea**

KEYNOTE PRESENTATION 3

11:30 – 12:00 **Rob Tanner** – Mitigating the impacts of invasive alien plants through international cooperation

SESSION 2: INVASIVE ALIEN SPECIES TRAITS AND TRENDS, VECTORS AND PATHWAYS OF INTRODUCTION
Chairs: Dušanka Cvijanović, Ahmet Uludağ

12:00 – 12:15 **Sven D. Jelaska** – Invading the habitat suitability models of invasive plants

12:15 – 12:30 **İlhan Üremiş, Necmi Aksoy, Ahmet Uludağ** – Problems related to aquatic alien plants in Turkey

12:30 – 12:45 **Antoaneta Petrova, Vladimir Marinov, Rosen Vassilev, Kamen Bakardzhiev, Boris Assyov** – A contribution to the woody alien flora of Bulgaria

12:45 – 13:00 **Violeta Boruz, Ioana Simion** – Invasive plants from Oltenia

13:00 – 14:30 **Lunch break**

SESSION 3: INVASIVE ALIEN SPECIES TRAITS AND TRENDS, VECTORS AND PATHWAYS OF INTRODUCTION (CONTINUATION)

Chairs: F. Güler Ekmekçi, Marius Skolka

KEYNOTE PRESENTATION 4

14:30 – 15:00 **Yuriy Kvach, Markéta Ondračková** – The parasites of invasive fish: the case of pumpkinseed, *Lepomis gibbosus* (Actinopterygii: Centrarchidae) in Europe

15:00 – 15:15 **Paraskevi K. Karachle, Maria Pantazi, Argyro Zenetos** – The biological profile of immigrant fish species in the Mediterranean

15:15 – 15:30 **Anna Maria Mannino, Paolo Balistreri, Alan Deidun** – Non-Indigenous Species (NIS) within Marine Protected Areas (MPAs). The case study of the Aegadian Islands MPA (Sicily, Tyrrhenian Sea) and the Dwejra MPA (Maltese Islands, Ionian Sea)

15:30 – 15:45 **Gülnaz Özcan, A. Serhan Tarkan** – The distribution of the invasive freshwater fish, topmouth gudgeon *Pseudorasbora parva* (Temminck & Schlegel, 1846) in Turkey

15:45 – 16:00 **Şerife Gülsün Kırankaya, F. Güler Ekmekçi, Lale Gençoğlu, Şeyda Tacer, Fatih Korkmaz, Murat Arslan** – Long chain fatty acid content of big-scale sand smelt (*Atherina boyeri*) from different ecosystems in Turkey

16:00 – 16:30 **Coffee & tea**

SESSION 4: INVASIVE ALIEN SPECIES TRAITS AND TRENDS, VECTORS AND PATHWAYS OF INTRODUCTION (CONTINUATION)

Chairs: Elena Tricarico, Dan Cogălniceanu

16:30 – 16:45 **Baran Yoğurtçuoğlu, Fıtnat Güler Ekmekçi, Paraskevi K. Karachle** – An overview of feeding habits and trophic levels of non-indigenous freshwater fishes in Turkey: preliminary results

16:45 – 17:00 **Ivan Špelić, Ana Gavrilović, Jonathan Gardner, Lidija Svečnjak, Mirna Mrkonjić Fuka, Neven Iveša, Danijela Mioković, Marina Piria** – Additional distributional data for the introduced Pacific oyster, *Magallana gigas* (Thunberg, 1793), in Croatia

17:00 – 17:15 **Tahir Özcan, A. Suat Ateş, Gülnaz Özcan** – The distribution of the alien Northern brown shrimp, *Farfantepenaeus aztecus* (Decapoda: Penaidae) in the Mediterranean Sea

17:15 – 17:30 **Octavian Pacioglu, Kathrin Theissinger, Andreea Alexa, Corina Samoilă, Ovidiu-Ioan Sîrbu, Anne Schrimpf, Jochen P. Zubrod, Ralf Schulz, Mălina Pîrvu, Sandra-Florina Lele, John Iwan Jones, Lucian Pârvulescu** – Multifaceted implications of the competition between native and invasive crayfish: A glimmer of hope for the native's long-term survival

17:30 – 17:45 **Marius Skolka, Oana Florea, Sebastian Apostol** – Mangalia Lake – an "oasis" for alien species

17:45 – 18:00 **Aleksandra Konjević, Miloš Petrović, Željko Milovac –** Movement of brown marmorated stink bug (*Halyomorpha halys*) through years and places in Serbia

18.00 – 19:00 **Poster presentations & discussions**

27TH SEPTEMBER 2018

SESSION 5: KEYNOTE PRESENTATIONS

Chairs: Aleksandra Konjević, Vladimir Vladimirov

KEYNOTE PRESENTATION 5

09:00 – 09:30 **Elena Tricarico** – How public engagement can help facing biological invasions

KEYNOTE PRESENTATION 6

09:30 – 10:00 **Ahmet Uludağ, Z. Filiz Arslan, Ayşe Yazlık, Necmi Aksoy** – Prevention of alien ornamental plants' invasions

KEYNOTE PRESENTATION 7

10:00 – 10:30 **Marius Skolka** – New invasive species in Dobroudja and in the Black Sea littoral area

10:30 – 11:00 **Coffee & tea**

SESSION 6: INVASIVE ALIEN SPECIES TRAITS AND TRENDS, VECTORS AND PATHWAYS OF INTRODUCTION (CONTINUATION)

Chairs: Paraskevi K. Karachle, Yuriy Kvach

11:00 – 11:15 **Elena Buhaciuc-Ioniţă, Marin Ioniţă, Mihaela Caplan, Ana-Maria Krapal** – A threat or a new species occupying an empty spot? Study on the *Magallana gigas* (*Crassostrea gigas* – the pacific oyster) populations in natural habitats from the Black Sea, Romania

11.15 – 11:30 **Marilena Onete, Jodey Peyton, Oliver Pescott, Owen Mountford, Minodora Manu, Roxana Nicoară** – Invasion of the alien species of river margins. Case study: Arieş River (Transylvania, Romania)

SESSION 6: THE DANUBE RIVER AS INVASIVE ALIEN SPECIES CORRIDOR

Chairs: Yuriy Kvach, Paraskevi K. Karachle

11:30 – 11:45 **Milcho Todorov, Rumen Tomov, Kostadin Ignatov, Dan Cogălniceanu, Momir Paunović, Teodora Trichkova** – Invasive alien species of EU concern in the Danube Region – testing of the smartphone application developed by the EC JRC

11:45 – 12:00 **Ioana Simion, Violeta Boruz** – Invasive alien plants from protected areas along the Danube River

SESSION 7: INVASIVE ALIEN SPECIES IMPACT

Chairs: Marilena Onete, Sven D. Jelaska

12:00 – 12:15 **Dušanka Cvijanović, Bojan Damnjanović, Maja Novković, Aleksandra Vesić, Milica Živković, Ana Anđelković, Snežana Radulović** – The role of invasive hydrophytes in structuring macrophyte assemblages in the newly-formed gravel pit lakes

12:15 – 12:30 **Ayşe Yazlık, Jan Pergl, Petr Pyšek** – Environmental and socioeconomic impact of alien plants in Turkey

12:30 – 12:45 **Marilena Onete, Larisa Florescu, Mirela Moldoveanu, Rodica Catana, Minodora Manu** – The tree of heaven (*Ailanthus altissima*): indicating the heaven or hell in the Romanian cities

SESSION 8: OTHER TOPICS

Chairs: Marilena Onete, Sven D. Jelaska

12:45 – 13:00 **Meliha Merve Hiz, Gülsüm Akkuş, Damla Yüksel Balim** – Genotoxic effects of *Rhamnus cathartica* on the human blood lymphocytes

13:00 – 13:15 **Meliha Merve Hiz, Sibel Oymak, Gülsüm Akkuş, Begüm Dermenci** – The genotoxic effects of *Chrysanthemum cinerariifolium* extract on the human blood lymphocytes

13:15 – 14:30 **Lunch break**

SESSION 9: INVASIVE ALIEN SPECIES PREVENTION AND MANAGEMENT; IAS DATA MANAGEMENT AND SHARING

Chairs: Cristina Preda, Rumen Tomov

14:30 – 14:45 **Cristiana-Maria Ciocănea, Athanasios-Alexandru Gavrilidis, Steluta Manolache, Laurenţiu Rozylowicz** – Participatory management of the invasive species *Ailanthus altissima* and *Amorpha fruticosa* in the Lower Siret Floodplain protected area

14:45 – 15:00 **Milka Glavendekić, Aleksandra Konjević, Aleksandar Lisica, Dejan Skočajić, Nadežda Stojanović, Mirjana Tešić, Ervin Vukasović** – Management of *Cydalima perspectalis* (Walk.) (Lepidoptera: Crambidae) populations in the historic park of the Monastery Beočin in Serbia

15:15 – 15:30 **Roxana Ciceoi, Adriana Radulovici** – *Pentatomidae* of economic importance in Romania – first DNA barcoding trials

15:30 – 15:45 **Zhelyu Avramov, Mariana Laginova, Dora Panayotova, Ivanka Ivanova, Marko Mihaylov** – Monitoring of the quarantine phytoplasmic diseases on the vine in Bulgaria in the period 2012–2018

15:45 – 16:15 **Coffee & tea**

SESSION 10: INVASIVE ALIEN SPECIES PREVENTION AND MANAGEMENT; IAS DATA MANAGEMENT AND SHARING (CONTINUATION)

Chairs: Milka Glavendekić, Marilena Onete

16:15 – 16:30 **Nikolaos Doumpas, Ioannis Giovos, Stefanos Kalogirou** – The misconception of pufferfish consumption in Greece through social media sentiment analysis

16:30 – 16:45 **Rumen Tomov, Teodora Trichkova, Vladimir Vladimirov, Ahmet Uludağ, Argyro Zenetos, Dan Cogălniceanu, David Finger, Milica Rat, Sashto Trajanovski, Sonja Desnica** – Contribution of ESENIAS-TOOLS project to IAS awareness raising in the ESENIAS region

16:45 – 17:00 **Rumen Tomov, Teodora Trichkova** – Public attitudes towards invasive alien species in Bulgaria

17:00 – 18:00 **Poster presentations & discussions**

28TH SEPTEMBER 2018

09:00 – 13:00 **Field trip**: Văcărești Natural Park (Bucharest)

13:00 – 14:30 **Lunch break**

14:30 – 16:00 **The 8th ESENIAS Workshop**

16:00 – 16:30 **Coffee & tea**

16:30 – 17:00 **Conference closing**

29TH SEPTEMBER 2018

10:00 – 13:00 **Visit**: "Grigore Antipa" National Museum of Natural History

POSTER PRESENTATIONS

TOPICS 1 AND 2: INVASIVE ALIEN SPECIES TRAITS AND TRENDS, VECTORS AND PATHWAYS OF INTRODUCTIONS

P01-01 **Tetyana S. Dvirna** – *Silphium perfoliatum* L. in the flora of the Romensko-Poltavsky Geobotanical Region

P01-02 **Vladimir Vladimirov –** *Hieracium amplexicaule* (Asteraceae): a new casual species to the Bulgarian flora

P01-03 **Aleksandra Savic, Danijela Pavlovic, Dragana Bozic, Sava Vrbnicanin** – Competition between *Ambrosia trifida* L. and *Ambrosia artemisiifolia* L.

P01-04 **Oana-Viorica Danci, Sretco Milanovici** – Contributions to the knowledge of invasive alien plant species in the middle hydrographical basin of Mureş River (Romania)

P01-05 **Mihaela Sămărghițan, Silvia Oroian, Corneliu Tănăse** – Contributions to the study of alien and invasive species in some protected areas in Mureș County

P01-06 **Eugenia Nagodă, Petronela Camen-Comănescu, Gavril Negrean, Sanda Lițescu, Paulina Anastasiu** – Alien plants from Văcăreşti Natural Park, Bucharest, Romania

P01-07 **Myroslav V. Shevera, Vira V. Protopopova, Raisa I. Burda, Liudmyla V. Zavialova, Oksana O. Kucher** – The alien flora of Ukraine: Main results of studies

P01-08 **Boris Assyov, Antoaneta Petrova, Rosen Vassilev, Kamen Bakardzhiev** – Balconies, tramway tracks and stonecrops – notable pathways of escape from gardening of members of *Sedum* and related genera in Bulgaria

P01-09 **Mihaela Urziceanu, Tatiana Eugenia Şesan, Paulina Anastasiu** – Do wind farms favour the spread of invasive alien plants in protected areas? Case study: ROSCI0206 Porţile de Fier & ROSCI0060 Dealurile Agighiolului

P01-10 **Ana Anđelković, Milica Živković, Dušanka Cvijanović, Dragana Marisavljević, Snežana Radulović, Danijela Pavlović** – Riparian invasion corridors of barnyard grass in Serbia

P01-11 **Constantina Chireceanu, Diana Ioana Petcu, Andrei Teodoru, Andrei Chiriloaie-Palade** – Population dynamics of *Orientus ishidae* and *Acanalonia conica* in Bucharest – Băneasa area in 2017, after one year from their first detection

P01-12 **Rumen Tomov, Cvetelina Vasileva –** Range expansion of *Metcalfa pruinosa* (Homoptera: Fulgoroidea) in Bulgaria

P01-13 **Oxana Munjiu, Ion Toderaş, Igori Şubernetkii** – Investigation of *Sinanodonta woodiana* (Lea, 1834) (Bivalvia, Unionidae) on the territory of the Republic of Moldova

P01-14 **Sasho Trajanovski, Konstantin Zdraveski, Sonja Trajanovska, Biljana Budzakoska Gjoreska, Teodora Trichkova –** Disturbed ecologi-

cal status may facilitate the introduction of invasive alien species in Lake Ohrid watershed

P01-15 **Lidija Velkova-Jordanoska** – Molecular identification of the red-bellied piranha (*Pygocentrus nattereri* Kner, 1858) caged in Dojran Lake

P01-16 **Iuliia Kutsokon, Yuriy Kvach** - The bullheads of genus *Ameiurus* (Actinopterygii: Ameiuridae) in Ukraine

P01-17 **Lali Murvanidze, Tsitsino Lomidze, Ketevan Nikolaishvili, Lela Arabuli, Ketevan Asatiani, Keto Davitaia** – *Carassius gibelio* (Bloch, 1782): comparative ecological overview of parasitic fauna in the Jandari and Madatapa Lakes

P01-20 **Tihomir Stefanov, Milcho Todorov, Kostadin Ignatov, Ivan Botev, Teodora Trichkova** – Distribution and pathways of introduction and spread of *Pseudorasbora parva* (Temminck & Schlegel, 1846) (Cyprinidae) in Bulgaria

P01-21 **Nicolae Crăciun, Adrian Ionaşcu** – The evolution and spread of invasive fish species in Văcăreşti Natural Park

TOPIC 3: THE DANUBE RIVER AS INVASIVE ALIEN SPECIES CORRIDOR

P03-01 **Paulina Anastasiu, Gavril Negrean** – Alien plant species in the Iron Gates Natural Park (Romania)

P03-02 **Teodora Trichkova, Milcho Todorov, Ivan Botev, Dan Cogălniceanu, Doru Bănăduc, Tihomir Stefanov, Luchezar Pehlivanov, Yuriy Kvach, Pavel Jurajda** – New records of invasive alien and translocated fish species in the Danube River and adjacent water bodies in Bulgaria and Romania

P03-03 **Adrian Ionașcu, Nicolae Crăciun** – Observations on the expansion of the invasive fish *Perccottus glenii* in Romania

P03-04 **Veniamin Zamorov, Mariya Zamorova, Yuriy Kvach** – Age-size structure of a round goby population in the Danube Delta, as a possible source for the invasive one in the Southern Corridor of Aquatic Invasions

TOPIC 4: INVASIVE ALIEN SPECIES IMPACT

P04-01 **Geta Rîșnoveanu, Cristina Popescu, Darmina Niță, Valentin Dinu, Marius Bujor, Corina Bradu, Constantin Cazacu** – Litter decomposition of exotic Japanese knotweed (*Fallopia japonica*) and common alder (*Alnus glutinosa*) in relation with longitudinal and transversal stream connectivity

P04-02 **Daniyar Memedemin, Cristina Preda, Marius Skolka** – *Ailanthus altissima* (Mill.) Swingle impact on biodiversity – preliminary data

P04-03 **Traian Manole, Laura Ioana Macavei, Petronela Camen-Comănescu** – The status and impact of the brown marmorated stink bug, *Halyomorpha halys* Stål (Heteroptera: Pentatomidae) in Romania

P04-04 **Roxana Ciceoi** – Facultative blood-sucking lace bugs, *Corythucha* spp., in Romania

P04-05 **İrfan Uysal** – The poisonous marine alien species in Turkish marine waters

TOPICS 5 AND 6: INVASIVE ALIEN SPECIES PREVENTION AND MANAGEMENT; MANAGEMENT AND SHARING OF IAS DATA

P05-01 **Boryana Katinova, Mariana Laginova** – Introduced species in Bulgaria – measures against them

P05-02 **Marija Saric-Krsmanovic, Ahmet Uludag, Jelena Gajic Umiljendic, Ljiljana Radivojevic, Ljiljana Santric, Ivana Potocnik, Rada Djurovic-Pejcev** – Bio-herbicidal effects of five essential oils on seed germination and early seedling growth of velvetleaf (*Abutilon theophrasti* Medik.)

P05-03 **Marga Grădilă, Daniel Jalobă** – Control measures for *Xanthium italicum* – an invasive species in maize crop in Romania

P05-04 **Traian Manole, Constantina Chireceanu, Andrei Teodoru, Andrei Palade Chiriloaie** – Monitoring the spreading of some invasive insect species in the south-east zone of Romania

P05-05 **Konstantin Zdraveski, Sasho Trajanovski** – Economic aspects of the invasive alien species: Holistic mitigation measures approach

P05-06 **Nataliia Pashkevych, Liudmyla Lysohor, Liubov Gubar** – The comparative analysis of alien plant species of the Ukrainian Information System: Families Asteraceae, Poaceae, Brassicaceae

P05-07 **Baran Yoğurtçuoğlu, Fıtnat Güler Ekmekçi –** An update of the database on the distribution of globally invasive *Gambusia holbrooki* in Turkish freshwaters

P05-08 **Cristina Sandu et al.** – International Association of Danube Research (IAD) and IAS expert group

P05-09 **Helen E. Roy, Quentin Groom et al.** – ALIEN CSI: Increasing understanding of alien species through citizen science

P05-10 **Elena Tricarico, Frances E. Lucy, Vadim E. Panov, Mark J. Costello, David Bruce Conn, Kit Magellan, Stelios Katsanevakis, Marnie L. Campbell, Eithne Davis, Laura N. H. Verbrugge, Laura Garzoli** – INVASIVESNET: International Association for Open Knowledge on Invasive Alien Species

OTHER TOPICS

P07-01 **Altuğ Çiçekliyurt** – The usage of invasive species and their impact on human health

P07-02 **Manana Lortkipanidze, Kazim Huseynov, Oleg Gorgadze, Mzia Kokhia, Madona Kuchava** – Entomopathogens against mosquitoes (Diptera: Culicidae)

P07-03 **Dunya A. Al-Kurjiya, Haifa Najee, Marcela Popa, Omar Sadik Shalal, Othman Al-Mahdawy, Grigore Mihăescu, Mariana Carmen Chifiriuc** – Antifungal activity of some plant extracts on non- *Candida albicans* spp. strains isolated from hospitalised patients

P07-04 **Irina Zarafu, Petre Ioniță, Maria Marinescu, Marcela Popa, Luminița Măruțescu, Mariana Carmen Chifiriuc, Paulina Anastasiu** – Bioevaluation of *Cuscuta campestris* total extracts for potential therapeutic applications

P07-05 **Alina M Holban, Alexandru M Grumezescu, Ghiță Bianca, Mănăstireanu Denisa, Hamzah Basil Mohammed, Sajjad Mohsin, Mariana Carmen Chifiriuc, Veronica Lazar, Ecaterina Andronescu** – Core-shell nanoparticles functionalised with essential oils with antimicrobial activity

P07-06 **Eka Tskitishvili, Eter Buchukuri, Lali Jgenti, Nana Bagathuria, Tamaz Tskitishvili, Medea Gigolashvili, Irakli Eliava** – Prevalence of potato tuber nematode in Tetritskaro (Eastern Georgia)

P07-07 **Irina Zarafu, Petre Ioniță, Maria Marinescu, Sorin Avramescu, Marcela Popa, Luminița Măruțescu, Paulina Anastasiu, Mariana Carmen Chifiriuc** – Influence of aqueous extracts of three plant species on microbial growth in planktonic and biofilm state

P07-08 **Irina Zarafu, Petre Ioniță, Maria Marinescu, Sorin Avramescu, Marcela Popa, Luminița Măruțescu, Mariana Carmen Chifiriuc, Paulina Anastasiu** – Bioevaluation of the antimicrobial properties of *Berberis vulgaris* extracts

P07-09 **Marian Constantin** – *Ailanthus altissima* and *Ambrosia artemisiifolia*, two invasive species in Cocora's vegetation (Ialomița County)

KEYNOTE PRESENTATIONS

EESENIAS AND DIAS NETWORKS: COLLECTION, MANAGEMENT AND SHARING OF IAS DATA TO SUPPORT KNOWLEDGE-BASED DECISION MAKING AT REGIONAL LEVEL

Teodora Trichkova[1], *Rumen Tomov*[2], *Ahmet Uludağ*[3], *Vladimir Vladimirov*[1], *Alexander Kotsev*[4], *Florian Ballnus*[5]

[1] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; trichkova@gmail.com
[2] Department of Plant Protection, University of Forestry, 10 Kliment Ohridski Blvd, 1797 Sofia, Bulgaria
[3] Plant Protection Department, Faculty of Agriculture, Çanakkale Onsekiz Mart University, 17100 Çanakkale, Turkey
[4] Joint Research Centre, European Commission, Ispra, Italy
[5] Bavarian State Ministry for the Environment and Consumer Protection; Priority Area 06 Coordinator, EU Strategy for the Danube Region, Munich, Germany

Effective policy making and management relies on a solid knowledge base, which largely depends on the availability and quality of underpinning data and the tools needed to share it between scientists, decision makers and managers. This is particularly true for the invasive alien species (IAS).

The East and South European Network for Invasive Alien Species (ESENIAS) has been active since 2011. Currently, the network has 15 member countries. One of the main aims of ESENIAS is collection, maintenance and sharing of IAS data. In order to initiate the collection and analysis of IAS data in the ESENIAS region, several joint research projects have been undertaken. The largest project implemented by the ESENIAS countries is the ESENIAS-TOOLS project: East and South European Network for Invasive Alien Species – A tool to support the management of alien species in Bulgaria (2015-2017).

The Danube Region Invasive Alien Species Network (DIAS) was established in 2014 and includes member countries from the Upper, Middle and Lower Danube River basin, as well as adjacent Black Sea region. In the implementation of its mission, DIAS also supports data collection and the sharing of IAS knowledge and expertise in a transnational context.

We present ESENIAS and DIAS data sources, including recent research projects, ESENIAS database status and content, data format, as well as future challenges related to quality assurance of data, database maintenance and update, and data management.

Furthermore, we present the DIAS strategy and work plan, which have been under development. The DIAS strategy follows the requirements of the EU Strategy for the Danube Region (2010) and the IAS Regulation (EU) 1143/2014, considering the demands of the region. The strategy will provide the goals and objectives, but

also possible measures and recommendations on seven key topics. Region specific requirements and relevant actors are defined as well. The seven key topics are: 1) IAS – Species and interactions/ impact in the DRB; 2) Pathways of introduction in the DRB; 3) Information system and knowledge dissemination; 4) Risk assessment, early warning, and prioritisation; 5) Early detection and rapid response; 6) Management of established IAS and restoration; and 7) Awareness raising and communication regarding IAS.

Key words: IAS regional networks, East and South Europe, Danube Region, data collection and management, database, strategy

INVASIVE ALIEN SPECIES SMART APP: PRELIMINARY RESULTS OF CITIZENS' RECORDS

Konstantinos Tsiamis[1], *Eugenio Gervasini*[1], *Sven Schade*[2], *Irena Mitton*[2], *Fabiano A. Spinelli*[2], *Roberto Sgnaolin*[2], *Ana Cristina Cardoso*[1]

[1] European Commission, Joint Research Centre – Directorate for Sustainable Resources, Water & Marine Resources Unit, Ispra, Italy; konstantinos.tsiamis@ec.europa.eu
[2] European Commission, Joint Research Centre - Directorate for Growth and Innovation, Digital Economy Unit, Ispra, Italy

Citizens can play an active role in Invasive Alien Species (IAS) early detection and management. The Joint Research Centre released in late 2016 the smartphone application (App) "Invasive Alien Species Europe", which allows users to report the presence of the 48 species listed as IAS of Union concern (EU Regulation 1143/2014) on the European territory. The App is free and its code is open source and available for re-use. By the end of 2017, 143 citizens' records were submitted through the App, of which 6 were not relevant, while the rest corresponded to species records, which were validated by the European Alien Species Information Network (EASIN) team, with the contributions of the EASIN Editorial Board. The validation process revealed that 31% (41 submissions) corresponded to IAS of Union concern. Most of them were *Pseudorasbora parva*, *Trachemys scripta*, *Myocastor coypus*, *Lagarosiphon major*, *Myriophyllum aquaticum*, *Procambarus clarkii* and *Sciurus carolinensis*, originating mostly from Bulgaria, Italy, Germany, France, Portugal, and UK. The remaining submissions corresponded to non-Union concern IAS (28%) or included internet photos (5%), photos from zoos (4%), blurry photos (3%) and double submissions (16%). Lastly, 13% of submissions contained photos of which identification was impossible, either because the target species was too far away or due to the lack of specific taxonomic characters (e.g. the fertile plants of *Lysichiton americanus, Heracleum* spp.). Validated records will be

fed into EASIN. Therefore, the App can act as a supplementary tool for Member States Competent Authorities official surveillance systems under the EU IAS Regulation. Further upgrades of the App are scheduled with the collaboration of the Member States and COST Action initiatives (e.g. CA17122, ALIEN-CSI).

Key words: alien species, invasive alien species, citizen science, smart app, EU Regulation, Union concern

MITIGATING THE IMPACTS OF INVASIVE ALIEN PLANTS THROUGH INTERNATIONAL COOPERATION

Rob Tanner[1]

[1] European and Mediterranean Plant Protection Organization (EPPO/OEPP), 21 Boulevard Richard Lenoir 75011 Paris, France; rob.tanner@eppo.int

The European and Mediterranean Plant Protection Organization (EPPO) is an intergovernmental organisation responsible for cooperation in plant health between 51 member countries. EPPO's responsibility in invasive alien plant (IAP) prevention is to analyse risks presented by specific IAP and recommend preventive measures for newly emerging species that have detrimental economic, ecological and social impact. When presented with a large pool of invasive, or potentially invasive alien plants, prioritizing species for pest risk analysis (PRA) is an essential prerequisite to focus limited resources. With this in mind, EPPO has developed a tool – the EPPO prioritization process for invasive alien plants which can be used to produce a list of invasive alien plants that are established or could potentially establish in the EPPO region, and to determine which of these have the highest priority for a PRA. For specific IAP species, EPPO facilitates Expert Working Groups to evaluate risks through the compilation of risk assessments. In addition, EPPO maintains an alert list of potentially harmful species along with a comprehensive database (EPPO Global Database (https://gd.eppo.int/) detailing species specific information. Through consultation, EPPO provides standards and guidelines for individual species and works with experts in industry and governments to provide codes of conducts for best practices. All of the aforementioned tools will be discussed in the context of management of IAP in the region. Finally, we will explore how the dissemination of information – in various formats – can be improved to assist stakeholders in the battle with IAP.

Key words: Pest risk assessment, prioritization, EPPO Global Database, alert list

THE PARASITES OF INVASIVE FISH: THE CASE OF PUMPKINSEED, *LEPOMIS GIBBOSUS* (ACTINOPTERYGII: CENTRARCHIDAE) IN EUROPE

Yuriy Kvach[1,2], *Markéta Ondračková*[2]

[1] Institute of Marine Biology of NAS of Ukraine, Odessa, Ukraine; yuriy.kvach@gmail.com
[2] Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Květná 8, 60365 Brno, Czech Republic

Parasite communities in species translocated to new areas usually comprise a reduced number of naturally co-introduced and locally acquired parasites. The number of co-introduced parasites depends on both their presence and density in the founder population and their ability to persist in the new environment. In Europe, one of the most successful introduced fish species is the pumpkinseed sunfish *Lepomis gibbosus* (Antinopterygii: Centrarchidae). It is native to freshwaters of eastern North America, ranging from New Brunswick in Canada to north-eastern Georgia in the USA. In its native range, the species is known to host over a hundred parasite species. In order to evaluate parasite communities of invasive pumpkinseed, populations from 9 European countries covering four see drainages were investigated for parasite infection. In total, 9 North-American parasite species, including 6 ancyrocephalid monogeneans (*Actinocleidus oculatus, A. recurvatus, Cleidodiscus robustus, Onchocleidus acer, O. similis, O. dispar*), 2 gyrodactylids (*Gyrodactylus avalonia, G. macrochiri*) and 1 digenean (*Posthodiplostomum centrarchi*) were registered in European pumpkinseed populations up to date. *G. avalonia* appears the only parasite potentially able to infest wider range of hosts. In addition, the pumpkinseed in Europe was locally parasitized with four other non-indigenous species: *Schyzocotyle acheilognathi*, *Anguillicola crassus*, *Neoergasilus japonicus* and *Sinanodonta woodiana*. The other 18 parasite species were acquired in the new area, including mainly non-specific larval endoparasites. Parasite communities were mostly dominated by North-American species with wider species range, but low abundances of local parasites, indicating relatively low importance of the non-native host for local parasite dynamics.

Key words: invasive fauna, monogeneans, co-introduction

HOW PUBLIC ENGAGEMENT CAN HELP FACING BIOLOGICAL INVASIONS

Elena Tricarico[1]

[1] Department of Biology, University of Florence, Italy, Via Romana 17, 50125 Florence, Italy; elena.tricarico@unifi.it

The recent EU Regulation on invasive alien species (IAS) (2014/ 1143) focuses on prevention as the most required approach to managing IAS. As this is a uniquely human problem, and we must all cooperate to solve it, public engagement is considered a key element for prevention. Firstly, the involvement of wider society is crucial to develop more responsible behaviours to enable the regulatory approach of the Regulation. An example is provided by the several codes of conduct (e.g. on horticulture, zoological gardens, pet owners) developed by the Bern Convention of the Council of Europe in partnership with the IUCN SSC Invasive Species Specialist Group and stakeholders. The codes aim at promoting good practices to prevent new introductions and further spread of IAS already established in an area. The LIFE project ASAP (Alien Species Awareness Program) GIE/IT/001039 is declining the codes in Italy to increase public awareness and engagement on IAS. Secondly, public participation is recommended for effective surveillance and monitoring. Citizen science (CS), i.e. the involvement of citizens in the scientific process, is recognized as a mechanism to achieve this objective. Usually data on IAS have been collected by scientists and mangers, but in the last years the role of citizens in this process has been progressively recognised, thanks also to new technologies as mobile devices that have increased the potential for access by many more people. To develop and implement CS in relation to IAS and to establish a European-wide CS-IAS network, a new COST Action, CA17122 "Increasing understanding of alien species through citizen science" (Alien CSI), has been recently promoted. Alien CSI will increase levels of participation and quality of engagement with current CS initiatives, ensuring and evaluating educational value, and improve the value outcomes for potential users including citizens, scientists, managers, policy-makers, local authorities, and stakeholders.

Key words: invasive alien species, awareness, public participation, codes of conduct, citizen science

PREVENTION OF ALIEN ORNAMENTAL PLANTS' INVASIONS

Ahmet Uludağ[1], *Z. Filiz Arslan*[2], *Ayşe Yazlık*[2], *Necmi Aksoy*[3]

[1] Plant Protection Department, Faculty of Agriculture, Canakkale Onsekiz Mart University, 17100 Çanakkale, Turkey; ahuludag@yahoo.com
[2] Plant Protection Department, Faculty of Agriculture and Nature Sciences, Düzce University, 81620 Düzce, Turkey
[3] Faculty of Forestry & DUOF Herbarium, Düzce University, 81620 Düzce, Turkey

Ornamental plants which are considered as one of the main pathway for plant invasions have been in increasing interest because of urbanization worldwide. In this presentation prevention of alien ornamental plants' invasions will be discussed with Turkey example. Use of exotic ornamental plants in private and public places has been increasing in Turkey for the last two decades. In the alien flora of Turkey, the majority of the alien taxa (86%) were introduced intentionally, which implies the importance of risk assessment, before plant introductions. The number of alien plants is less than many other countries comparing to the number of taxa Turkey has. Among alien species in Turkey circa 60% (196 species) are ornamental wild plants. Most of them have been noted in restricted areas in Turkey, while some are already widespread. Among them, 56 ornamental plants were considered as potentially invasive for Turkey because of their invasiveness status in other countries which has similar biogeography. The native range of these 56 species are Asia and America, including more than 20 species for each continent. Among them, 10 species have priority for Turkey in terms of their invasiveness status in EPPO region. Also, certain species are among the 100 worst invasive alien species in the world: *Acacia mearnsii*, *Arundo donax*, *Lantana camara*, *Ulex europaeus*, *Eichhornia crassipes*, and *Halophila stipulacea*. Alien ornamental plant imports are increasing in addition to currently used ornamental plants that might escape to the nature. Turkey has no dedicated act on invasive alien species except being one of the parties of the Convention of Biological Diversity and Council of Europe, having a strategic plan on biodiversity and plant quarantine related acquis. It is concluded that Turkey still has a chance to prevent new introductions of invasive ornamental alien plants. But, it requires large awareness activities from policy makers to consumers, which can be achieved by involving all stakeholders in the system.

Key words: ornamental plants, invasive alien plants, prevention, management, Turkey

NEW INVASIVE SPECIES IN DOBROUDJA AND IN THE BLACK SEA LITTORAL AREA

Marius Skolka[1]

[1] Ovidius University of Constanta, Natural Sciences Department, Aleea Universității nr. 1, corp B, Constanța 900470, România; mskolka@gmail.com

Over the past five years, a number of alien terrestrial, freshwater and marine species have appeared in Dobrogea. The most obvious case is that of the ragweed *Ambrosia artemisiifolia*, which in recent years has become extremely common in the northwest and southeast Dobrogea, along roads but close to the Danube, where now can be seen on large surfaces. Some of the invertebrate species arrived in Dobroudja and in the littoral area after previous mentions in the rest of Romania – the harlequin ladybeetle *Harmonia axyridis,* green stink bug *Nezara viridula,* western conifer seed bug *Leptoglossus occidentalis,* brown marmorated stink bug *Halyomorpha halys,* lime seed bug *Oxycarenus lavaterae,* box tree moth *Cydalima perspectalis* etc. Some of them have developed in Dobrogea large populations and become common everywhere, as *Harmonia axyridis, Halyomorpha halys, Nezara viridula* – while others – like *Leptoglossus occidentalis, Oxycarenus lavaterae, Cydalima perspectalis* – remained localized in urban areas present on host plants of ornamental species category.

Regarding freshwater alien species, in recent years has been reported an "explosion" of populations of the magnificent bryozoans *Pectinatella magnifica* in the Danube Delta area (both in Romanian and Ukrainian part of Danube Delta Biosphere Reserve). Pacific oyster *Crassostrea gigas* was introduced in the past in aquaculture in the southern part of the Romanian littoral has been mentioned in recent years from Agigea Harbor area, where develop into stable populations. The flatback mud crab *Eurypanopaeus depressus*, mentioned in isolated specimens in front of Romanian littoral develop also a stable population in the Mangalia Lake area. Another recent mentioned species - the Asian tiger mosquito *Aedes albopictus* – remain localised in urban areas, which can be found during the warm season, but his presence is a discrete one.

Key words: invasive species, Black Sea littoral area

PRESENTATIONS

TOPIC 1: INVASIVE ALIEN SPECIES TRAITS AND TRENDS

Invasive alien species introductions and spread, biological and ecological characteristics; characteristics of recipient environment; invasive alien species and climate change

TOPIC 2: VECTORS AND PATHWAYS FOR INVASIVE ALIEN SPECIES INTRODUCTIONS

Analysis, prioritisation, action plans

INVADING THE HABITAT SUITABILITY MODELS OF INVASIVE PLANTS

Sven D. Jelaska[1]

[1]Department of Biology, Faculty of Science, University of Zagreb, Rooseveltov trg 6, HR-10000 Zagreb, Croatia; sven.jelaska@biol.pmf.hr

Invasive alien species (IAS) related problems does not seems to decrease. Consequently, neither as our attempts to better understand mechanisms of their successful spreading worldwide. Among various aspects of our survey on IAS is predicting their distribution, whether for purpose of optimising demanding field work (in terms of resources i.e. time and money) or for estimation of their survival/spread driven by possible future scenarios e.g. climate change. Whichever our objective is, our models will be influenced by: model type (e.g. regression, CART, DA, GAM, etc.); dependent data set (sample size and data precision); independent data set i.e. predictors (their relevancy for modelled IAS). Here, I have compared MaxEnt based habitat suitability models for several IAS plants (e.g. *Erigeron anuus, Robinia pseudoacacia, Reynoutria × bohemica, Ailanthus altissima*) for territory of Croatia. Models were developed based on different sample sizes and spatial accuracy of data on the IAS, and different sets of predictor variables in terms of their spatial resolution and content (e.g. relief, climate and disturbance). Different sets of predictor variables can yield almost incomparable outputs in terms of their spatial overlap and predicted area, especially when comparing climate-only data with other combinations. When varying different sample size and spatial accuracy of IAS data, spatial overlap was more congruent among different models when comparing spatially more precise data (17% for *Robinia* and 22% for *Erigeron*) then with less spatially precise data (just 1% for *Robinia* and 2.5% for *Erigeron*). Comparison of different sample sizes, within same class of spatially precision of data, were much more consistent with larger overlap with increase of the spatial precision (e.g. up to 35% for *Robinia*). Observed inconsistencies emphasize the necessity for critical evaluation of predictive models, in which we should use our knowledge of ecology on species of interest, and not vice-versa.

Key words: Croatia, logistic output, predictive modelling, ecology

A CONTRIBUTION TO THE WOODY ALIEN FLORA OF BULGARIA

Antoaneta Petrova[1], *Vladimir Marinov*[2], *Rosen Vassilev*[3], *Kamen Bakardzhiev*[3], *Boris Assyov*[4]

[1]Botanical Garden, Bulgarian Academy of Sciences, P.O. Box 664, 1000 Sofia, Bulgaria; petrovabotgar1@abv.bg
[2]Krichim Park, 4223 Kurtovo Konare, Bulgaria
[3]Bulgarian Biodiversity Foundation, 39-41 Vestletz Str., 1202 Sofia
[4]Department of Plant and Fungal Diversity and Resources, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Str., 1113 Sofia, Bulgaria

Recent observations in two old parks (Vrana Park near Sofia and Krichim Park near Krichim town) and in some other places with planted ornamental woody plants provided new data about self-reproduction and establishment of many alien woody ornamental plants. Data about *Abies pinsapo*, *Berberis julianae*, *Buxus sempervirens*, *Gingko biloba, Metasequoia gliptostroboides, Pseudotsuga menziesii* subsp. *glauca, Sapindus mucorossi* are the first reported ones for Bulgaria. New data are collected also for the species *Catalpa ovata, C. bignonioides, Celastrus orbiculatus, Dyospyrus lotus, Quercus ilex, Viburnum rhytidophyllum* which were reported only recently as aliens or as species that self-reproduce in Bulgaria. We present information about the age of self-reproduced individuals, population sizes/extent of reproduction and means of distribution. The royal family in Bulgaria established both Vrana Park and Krichim Park at the first decades of the past century as private parks around family estates. They host rich and unique for Bulgaria diversity of ornamental plants, especially woody ones. Historically the access to the parks was a limited one as it is now as well. We discuss the ecological conditions in the parks and recent management practices as factors that advance the self-reproduction and self-establishment of many ornamental taxa. Considerations are made about the alien status of the reported taxa. The contribution enlarges the list of ornamental escapes in the country.

Key words: woody alien species, Bulgarian flora

INVASIVE PLANTS FROM OLTENIA

Violeta Boruz[1], *Ioana Simion*[1]

[1]University of Craiova, "Al. Buia" Botanical Garden, Craiova, Romania, 32 C-tin Lecca St.; violetaboruz@yahoo.com

The article is a contribution to the knowledge of the invasive species in Oltenia, bringing new information for some species regarding corology, spreading, ecological niches, and degree of invasiveness. Oltenia Historical and Geographical Province

is situated in the south-west of Romania, being bounded to the east by the Olt River, to the south and west by the Danube, and to the north by the Southern Carpathians. With such a position, the analyzed region is in the path of landing routes: the Timiş-Cerna Lane, the Jiu Valley (through the Lainici Pass) and the Valea Oltului (through the Turnu Roşu), the Lotrului Gorge crossed by DN67 (from the XX-th century), a mountain road terraced by Romanian legionaries, leaving from Curtea de Argeş and Piteşti outside the province; on water: the bridge over the Danube, built by the Romans. As time passes, new roads have been built (roads and railways) and naval and airway routes have emerged. They favoured and facilitated the penetration of allochtonous species in this province. Oltenia has an important biological plant capital, for which Special Areas for Conservation (SAC) and Sites of Community Importance (SCI) have been created. Unfortunately, only the establishment of the Natura 2000 network and the inventory and monitoring of species and habitats is not enough to conserve this capital, but active conservation measures are needed, including the removal of invasive species from native natural ecosystems. This article also presents the measures proposed for this purpose.

Key words: invasive plants, Oltenia, impact, biodiversity

THE BIOLOGICAL PROFILE OF IMMIGRANT FISH SPECIES IN THE MEDITERRANEAN

Paraskevi K. Karachle[1], *Maria Pantazi*[1], *Argyro Zenetos*[1]

[1]Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research, 46.7 km Athens Sounio ave., P.O. Box 712, 19013 Anavyssos Attiki, Greece; pkarachle@hcmr.gr

In the present report we compiled and analysed the biological traits of 210 immigrant fishes in the Mediterranean Sea, based on information archived in FishBase. The biological data compiled included: (a) maximum reported and infinite length; (b) length and age at maturity; (c) life span and generation time; (d) trophic level; (e) growth coefficient k of the von Bertalanffy growth function; (f) natural mortality; (g) preferred temperature; (h) resilience (i.e. ability to withstand exploitation) and vulnerability (i.e. catchability). All species were classified according to their habitat, pathway of arrival and establishment success.

The analyses revealed that the bulk of Mediterranean emigrants are mainly reef-associated species, with preferences to high temperatures yet of a limited range (stenothermophilic species). They are short lived, generally small sized animals that sexually mature early and reach small sizes. In addition, the majority of species showed medium to high resilience, combined with low to medium vulnerability.

The aforementioned features, appeared at higher rates in established species, than in the casual ones. Approximately half of the species were omnivores with preference to animals. Herbivores and omnivores with preference to plants were the least represented species. Yet, provided that native Mediterranean species of the latter two trophic categories are scarce, this characteristic is rather significant for the invasion potential of fish. Future research should focus in comparisons between immigrants, indigenous Mediterranean species and those present in the Red Sea, in order to identify potential new immigrants, through a horizon scanning process.

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Key words: biological traits, non-indigenous fishes, Mediterranean

NON-INDIGENOUS SPECIES (NIS) WITHIN MARINE PROTECTED AREAS (MPAS). THE CASE STUDY OF THE AEGADIAN ISLANDS MPA (SICILY, TYRRHENIAN SEA) AND THE DWEJRA MPA (MALTESE ISLANDS, IONIAN SEA)

Anna Maria Mannino[1], *Paolo Balistreri*[2], *Alan Deidun*[3]

[1]Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, Section of Botany and Plant Ecology, University of Palermo, Via Archirafi 38, 90123 Palermo, Italy; annamaria.mannino@unipa.it
[2]Bio&Tec Soc. Coop., Via Marinella 33 B, 91100 Trapani, Italy
[3]Department of Geosciences, Faculty of Science, University of Malta tal-Qroqq campus, Msida MSD 2080 Malta

The introduction of non-indigenous species (NIS) has been pointed out as a major threat to biodiversity. NIS may become invasive alien species (IAS) and may cause biodiversity loss and ecosystem service changes. In the Mediterranean Sea, Sicily and surrounding islands, also including a high number of Marine Protected Area (MPAs), as a consequence of their geographic position and the intense maritime traffic, is a region particularly vulnerable and prone to NIS invasions. Since frontiers do not exist in the sea, biological invasions may severely affect MPAs, whose major aim is biodiversity conservation.

Among the Sicilian MPAs, the Aegadian Islands MPA report the highest number of NIS (19). Maritime traffic has certainly spearheaded the introduction and spread of these NIS. The presence of *Caulerpa cylindracea* in all the Sicilian MPAs, confirms the invasiveness of this species. Within the Aegadian Islands MPA anchoring is the main vector for the spread of this NIS, which has affected algal diversity but also favoured

the establishment of other NIS namely the sabellid *Branchiomma bairdi*. Within the Dwejra MPA (Maltese Islands), anchoring has favoured the colonization by a number of vegetal NIS, namely the phanerogam *Halophila stipulacea* and the alga *Caulerpa taxifolia* var. *distichophylla*, mainly by creating clearances within the previously continuous *Posidonia oceanica* meadow. The high presence of NIS in MPAs confirms that they are not immune to NIS invasions. The expansion of NIS by recreational vessels represents a risk for MPAs, which are popular touristic destinations. The dissemination of good practices may stop new introductions, therefore enhancing biodiversity conservation.

The creation of permanent observatories and alarm systems involving Sicilian and Maltese MPAs, able to early detect new introductions and to follow the spread of species already present might be an effective tool in the management of present and future introductions of NIS in MPAs.

Key words: Biodiversity, Marine Protected Areas, Mediterranean Sea, Non-Indigenous Species

THE DISTRIBUTION OF THE INVASIVE FRESHWATER FISH, TOPMOUTH GUDGEON *PSEUDORASBORA PARVA* (TEMMINCK & SCHLEGEL, 1846) IN TURKEY

Gülnaz Özcan[1], *A. Serhan Tarkan*[2, 3]

[1]İskenderun Technical University, Faculty of Marine Sciences and Technology 31200 İskenderun, Hatay, Turkey; gulnazozcan@gmail.com
[2]Muğla Sıtkı Koçman University, Faculty of Fisheries, 48000 Kötekli, Muğla, Turkey
[3]Department of Ecology and Vertebrate Zoology, Faculty of Biology and Environmental Protection, University of Łódź, 12/16 Banacha Str., 90-237 Łódź, Poland

The aim of the present paper is to reveal the distribution range of invasive freshwater fish species, topmouth gudgeon *Pseudorasbora parva* (Temminck & Schlegel, 1846) in Turkey based on the literature review. After the first report of the species from the Meriç River in Thrace (European part of Turkey) in 1982, it has spread across the country mainly through human mediated accidental introductions and has now been reported from fifty-four water bodies in total. We also present introduction pathways and chronological distribution pattern of the species. This information is thought to be useful especially for conservation native/endemic ichthyofauna due to detrimental impact of topmouth gudgeon through particularly introducing an emerging infectious eukaryotic intracellular pathogen on the fungal–animal boundary, *Sphaerothecum destruens*.

Key words: Non-native fish, introduction, inland, spread, Anatolia

LONG CHAIN FATTY ACID CONTENT OF BIG-SCALE SAND SMELT (*ATHERINA BOYERI*) FROM DIFFERENT ECOSYSTEMS IN TURKEY

Şerife Gülsün Kırankaya[1], F. Güler Ekmekçi[2], Lale Gençoğlu[1], Şeyda Tacer[3], Fatih Korkmaz[3], Murat Arslan[3]*

[1]Department of Biology, Faculty of Arts and Sciences, Düzce University, Konuralp Campus, 81620 Düzce, Turkey; gkirankaya@gmail.com
[2]Biology Department, Faculty of Science Hacettepe University, Beytepe Campus, 06800 Ankara, Turkey
[3]Department of Aquaculture, Faculty of Fisheries, Atatürk University, 25240 Erzurum, Turkey

The big-scale sand smelt naturally inhabiting all the sea coasts of Turkey, has been accidentally introduced into many freshwater lakes and reservoirs for more than 40 years. Thereafter it has rapidly established successful and dense invasive populations in many inland water bodies and has great commercial importance. Currently *Atherina boyeri* is an important fish species consumed as a food and became a source of fishing revenue as it has been exported many countries. In the present study we aimed to evaluate the nutritional value of this species on the emphasis of long chain omega-3 and omega-6 fatty acids such as eicosapentaenoic acid (EPA; 20:5n-3), docosahexaenoic acid (DHA; 22:6n-3) and arachidonic acid (ARA; 20:4n-6). Fish were sampled seasonally during May 2015 and June 2016 from 11 different locations across Turkey. The locations/habitats exhibited district characteristics in several aspects such as salinity, electrical conductivity and average water temperature. Whole body lipid content ranged from 2.3% (Cunda) to 6.6% (Aslantas), averaging 3.9% for all samples. Significant differences were observed in the amount aforementioned fatty acids depending on the locations/habitats. EPA was the highest in fish from Egirdir (7.2%) and lowest in those from Giresun (4.7%). Fish from Mudanya and Cunda exhibited the highest DHA level (19.7 and 19.8%, respectively) while those from Iznik had the lowest amount (7.7%). In all cases, whole body lipids were rich in ARA with the highest level (7.0%) in fish from Iznik and lowest value (2.2%) in those from Camlik. Our results indicate that long chain omega-3 and omega-6 fatty acids contents of big-scale sand smelt gives it a good potential for both human and animal nutrition. We also conclude that in addition to the diet, other habitat related factors depending on the different locations may influence the fatty acid profile in big-scale sand smelt.

Key words: Lipids, fatty acids, invasive fish, translocated fish

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AN OVERVIEW OF FEEDING HABITS AND TROPHIC LEVELS OF NON-INDIGENOUS FRESHWATER FISHES IN TURKEY: PRELIMINARY RESULTS

Baran Yoğurtçuoğlu[1], *Fitnat Güler Ekmekçi*[1], *Paraskevi K. Karachle*[2]

[1]Hacettepe University, Faculty of Science, Biology Department, Beytepe Campus, Çankaya/Ankara, P.C. 06800, Turkey; yokbaran@gmail.com
[2]Institute of Marine Biological Resources and Inland Waters, Hellenic Centre for Marine Research, P.O. Box 712, 19013 Anavyssos Attiki, Greece

Using the knowledge on the feeding habits and trophic levels of non-indigenous species (NIS) may have prominent role in their successful management. To date, 25 NIS freshwater fishes have been recorded in Turkey, 10 of which have established viable populations in natural and/or artificial aquatic environments. In this study, we compiled and analysed the existing stomach content data of NIS freshwater fishes in Turkey. In this context, we analysed 15 studies which cover 5 species that belong to 4 families (*Carassius gibelio, Pseudorasbora parva, Lepomis gibbosus, Gambusia holbrooki, Oncorhyncus mykiss*). Based on the reported data from the original studies, we estimated the fractional trophic levels (TROPHs) of each species using the stand-alone ACCESS routine TROPHLAB. When available, the estimates were made for each studied case (e. g. sampling station, season, etc.) and size class. According to the results, TROPH values ranged from 2.00 to 3.42. Overall, in more than half of the studies species are characterized as omnivores either with a preference for animal or plant material. Based on the results of this study there is still missing information for at least 10 established freshwater NIS in Turkey and future studies should focus on filling in this knowledge gap.

Key words: alien fish, feeding habits, fractional trophic levels, Stomach content, Turkey

ADDITIONAL DISTRIBUTIONAL DATA FOR THE INTRODUCED PACIFIC OYSTER, *MAGALLANA GIGAS* (THUNBERG, 1793), IN CROATIA

Ivan Špelić[1], Ana Gavrilović[2], Jonathan Gardner[3], Lidija Svečnjak[1], Mirna Mrkonjić Fuka[4], Neven Iveša[2], Danijela Miokovič[5], Marina Piria[1]

[1]University of Zagreb, Faculty of Agriculture, Department of Fisheries, Beekeeping, Game management and Special Zoology, Svetošimunska cesta 25, 10000 Zagreb, Croatia; ispelic@agr.hr
[2]Juraj Dobrila University of Pula, Department of Natural and Health Sciences, Zagrebačka 30, 52100 Pula, Croatia
[3]Victoria University of Wellington, School of Biological Sciences, Victoria University of Wellington, PO Box 600, Wellington 6140, New Zealand
[4]University of Zagreb, Faculty of Agriculture, Department of Microbiology, Svetošimunska cesta 25, 10000 Zagreb, Croatia
[5]Crotian Agriculture and Forestry Advisory Service, Savska cesta 41, 10000 Zagreb Croatia

Oysters, including the Pacific oyster *Magallana gigas*, are popular aquaculture species and are therefore moved and introduced worldwide. The Pacific oyster is native to the northwest Pacific Ocean and is the most agressive invader of all oyster species. It was first introduced to Europe (France) in the 1960s for aquaculture. Its first record in the Croatian region of the Adriatic Sea was in 1972 in Istria (Lim Bay), where it was intentionally introduced to determine its potential as an aquaculture species and from where it is presumed to have spread to form wild colonies. So far, wild Pacific oyster colonies are restricted to the northern part of the Adriatic Sea along the Istrian Peninsula, where only a few colonies have been recorded (Budava Bay, Lim Bay). In June 2017, two colonies of oysters were found in a bay near Medulin, Istria. Some individuals had an unusual morphology and could not be identified to species from their shells, but were suspected to be Pacific oysters. A small piece of mantle edge tissue was excised from each specimen, preserved in 96% ethanol and stored at 4°C for molecular analysis. After total genomic DNA isolation, the species-specific mitochondrial gene cytochrome c oxidase I gene (COI) was analysed for each sample. Results showed that colonies were mixed, including both Pacific oysters and native European flat oyster *Ostrea edulis*, Linnaeus 1758. All specimens identified as Pacific oysters had valves with an unusual toothed shape. In the intertidal zone the Pacific oysters were located above the native oysters. These findings are additional proof that invasive Pacific oysters are spreading across the northern Adriatic region and that they should be monitored as a potential threat to native European flat oysters, because they are competing for food with them and are also feeding on native oyster larvae.

Key words: Pacific Oyster, *Magallana gigas*, invasive species, Northern Adriatic Sea, Istria, European Flat Oyster

THE DISTRIBUTION OF THE ALIEN NORTHERN BROWN SHRIMP, *FARFANTEPENAEUS AZTECUS* (DECAPODA: PENAIDAE) IN THE MEDITERRANEAN SEA

Tahir Özcan[1], A. Suat Ateş[2], Gülnaz Özcan[1]

[1]İskenderun Technical University, Faculty of Marine Sciences and Technology 31200 İskenderun, Hatay, Turkey; tahozcan@gmail.com
[2]Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology 17100 Çanakkale, Turkey

The present paper is on the recent information about the distribution range of alien Northern Brown shrimp *Farfantepenaeus aztecus* (Ives, 1891) from the Mediterranean Sea. Alien shrimp species comprise dense populations along the coast of the eastern Mediterranean Sea. Among these invasive shrimps, *Farfantepenaeus aztecus* has a potential for colonising the native habitats of autochthonus species. The population structure of *F. aztecus* in the Mediterranean ecosystem must be studied in detailed.

Key words: *Farfantepenaeus aztecus*, Decapoda, alien, distribution, Turkey, Mediterranean Sea

MULTIFACETED IMPLICATIONS OF THE COMPETITION BETWEEN NATIVE AND INVASIVE CRAYFISH: A GLIMMER OF HOPE FOR THE NATIVE'S LONG-TERM SURVIVAL

Octavian Pacioglu[1], Kathrin Theissinger[2], Andreea Alexa[3], Corina Samoilă[3], Ovidiu-Ioan Sîrbu[3], Anne Schrimpf[2], Jochen P. Zubrod[2], Ralf Schulz[2], Mălina Pîrvu[1], Sandra-Florina Lele[1], John Iwan Jones[4], Lucian Pârvulescu[1]*

[1] Department of Biology-Chemistry, Faculty of Chemistry, Biology, Geography, West University of Timișoara, 300115 Timișoara, Romania; lucian.parvulescu@e-uvt.ro
[2] Institute for Environmental Sciences, University of Koblenz-Landau, 76829 Landau, Germany
[3] Department of Biochemistry and Pharmacology, Faculty of Medicine, "Victor Babeș" University of Medicine and Pharmacy Timișoara, 300041 Timișoara, Romania
[4] School of Biological and Chemical Sciences, Queen Mary University of London, E1 4NS London, UK

Over the years, biological invasions species became a milestone in both theoretical and applied ecology. However, the management of invasive species requires deep understanding of the phenomena supported by evidence from field investigations. A real-time invasion process between a native (*Pontastacus leptodactylus*) and an invasive (*Faxonius limosus*) crayfish species was capitalized in the Lower Danube through an interdisciplinary approach by measuring various ecological, genetical, physiological and biometrical endpoints. The results revealed that the prolonged

competition either drove the native species to extinction, or, surprisingly, allowed its survival as highly fragmented populations. The genetic diversity of the native crayfish populations was strongly reduced in invaded sectors, showing that the population size contraction and spatial patchy distribution decreased significantly the odds of encountering with other conspecifics from non-invaded areas. However, severe costs for several biological traits were depicted in the remnant populations of native species, showing increased elemental imbalance for two major macronutrients (C and N), decreased trophic position, omnivory index within the food webs and strongly contracted trophic niche widths. The invasive crayfish proved to be superior regarding the abovementioned aspects, rising its trophic position, degree of omnivory and strongly overlapping the trophic niche with the native species in the active areas of encountered competition. The strong interspecific competition in the invaded areas where the native crayfish survived were found encountering males with bigger and heavier claws, which expectedly increased their chances for securing resources in face of prolonged competition. The results show that invasive and native crayfish species cope differently with various ecological challenges. Our findings shed hope for the expected future of native crayfish species in the context of upcoming generalized invasions.

Key words: *Pontastacus leptodactylus*, biological invasions, *Faxonius limosus*, invasive species, populations genetics, RNA/DNA ratio, stable isotopes

MANGALIA LAKE – AN "OASIS" FOR ALIEN SPECIES

Marius Skolka[1], *Oana Florea*[1], *Sebastian Apostol*[1]

[1]Ovidius University of Constanta, Natural Sciences Department, Aleea Universității nr. 1, corp B, Constanța 900470, România; mskolka@gmail.com

Located in the southern Romanian coast and representing a former river mouth, Mangalia Lake is currently characterized by the mixing of seawater with freshwater. The brackish water of Mangalia Lake is isolated by an earth dam of Limanu Lake, which continues upstream the former river valley.

Due to the mixture of sea water entering through the bay Mangalia with fresh water which seeps from the Limanu Lake, the salinity of the Mangalia lake decrease upstream – from 10 - 11°/$_{oo}$ in the eastern part of the lake, near the sea, to 2.7 – 3.4°/$_{oo}$ in the western part, allowing the development of a benthal fauna in which remarcable is the presence of some alien species.

In recent years, several studies conducted in the brackish part of the Lake Mangalia showed that in the low salinity waters develops a benthic fauna characterized

by the presence of large colonies of tubeworm *Ficopomatus enigmaticus*. Advancing to the opening in the sea, the structure of the benthic fauna changes, *Ficopomatus enigmaticus* being represented mostly by isolated specimens, but with emerging species like the sea anemone *Haliplanella lineata,* mud crab *Rhithropanopeus harrisii tridentatus,* flatback mud crab *Eurypanopeus depressus* and the nudibranch *Corambe obscura*. Bivalvae like *Mya arenaria* and *Anadara kagoshimensis* are also present in benthos. In zooplankton often penetrate from the sea other invasive species like *Mnemiopsis leidyi* and *Beroe ovata*. The bay barnacle *Amphibalanus improvisus*, another alien species present all arround the Black Sea is present in all the lake, both in the low salinity waters from the western part of the lake as in the area where the salinity increases gradually reaching normal values for the Black Sea.

Benthic fauna of Lake Mangalia proves to be a true melting pot in which alien species and native species form extremely interesting associations depending on water salinity.

Key words: invasive species, Mangalia Lake

MOVEMENT OF BROWN MARMORATED STINK BUG (*HALYOMORPHA HALYS*) THROUGH YEARS AND PLACES IN SERBIA

Aleksandra Konjević[1], *Miloš Petrović*[1], *Željko Milovac*[2]

[1]Faculty of Agriculture, University of Novi Sad, Trg Dositeja Obradovića 8, 21101 Novi Sad; sashak@polj.uns.ac.rs
[2] Institute of Field and Vegetable Crops, Maksima Gorkog 30, 21101 Novi Sad, Serbia

Native to East Asia, invasive Brown Marmorated Stink Bug (BMSB), *Halyomorpha halys* (Stål, 1855) (Heteroptera, Pentatomidae) is becoming cosmopolitan insect species by inhabiting also USA and Europe. First records in Europe are dating back in 2004 in Liechtenstein, and from that time until today, *H. halys* invaded almost every Central and Southern European country. First speciemens of BMSB in Serbia were photographed in October 2015, in town Vršac, at Serbian - Romanian border and in urban zones of Belgrade. Monitoring conducted in following three years showed that *H. halys* successfully survived first winters and started to establish population in newly invaded area. By the time, new areas positive to presence of BMSB were recorded. First findings of *H. halys* were in urban zones, on platanus trees and hibiscus. Later, the hosts list was expanded by several agricultural crops as soybean, tomato and pepper, but the area of specimens' distribution remain in urban zones, or in its vicinity. Economic losses or damage were still not confirmed in any of mentioned crops.

On the other side, BMSB showed its nuisance behavior and caused panic in urban zones of Belgrade and Vršac in autumn 2016, during period of searching for over-wintering shelters.

This work is a review of *H. halys* establishment, distribution and pest/nuisance behavior in three years, since its occurrence in Serbia, including list of host crops and possible damage in the coming years.

Key words: *Halyomorpha halys*, establishment, monitoring, Serbia

Acknowledgements: Present study was supported by the Serbian Ministry of Agriculture and Environmental Protection, Plant Protection Directorate

A THREAT OR A NEW SPECIES OCCUPYING AN EMPTY SPOT? STUDY ON THE *MAGALLANA GIGAS* (*CRASSOSTREA GIGAS*-THE PACIFIC OYSTER) POPULATIONS IN NATURAL HABITATS FROM THE BLACK SEA, ROMANIA

Elena Buhaciuc-Ionita[1], *Marin Ionita*[1], *Mihaela Caplan*[1], *Ana-Maria Krapal*[2]

[1]"Natura-Z" Research and Education Society for Biodiversity Conservation, Dorului Str. No. 123, Constanta, 900374, Romania; elena_buhaciuc84@yahoo.com
[2]"Grigore Antipa" National Museum of Natural History, Sos. Kiseleff no. 1, Bucharest 011341, Romania

Native to the Far East Pacific *Crassostrea gigas* is being used worldwide in aquaculture, being already in many areas an alien species. In August 2017, we found two populations of *Crassostrea gigas* in rocky substrate area from the Agigea harbor. We conducted therefore quantitative and qualitative studies. In 2018 we found another two groups along the same dam, suggesting that the area occupied by this species could be much bigger. The depth range varied between 4-10 meters. The entire surface covered by the Pacific oyster populations is over 350 m^2. The density is relatively low, for both populations with an average of 1.16 oyster individuals/1m^2. The smallest size was 5.2 cm, the largest size was 18.6 cm and the average size was 10.35. The relative small number of Pacific oyster individuals and their relative small average size suggests that this populations are young, around 5 years old, taking in count that a Pacific oyster individual grows in the first year of life around 4-5 cm. To confirm the morphological identification of the oyster species present in the Black Sea at the Romanian littoral, we used the DNA barcoding method. The specimens were sequenced for the COI (Cytochrome Oxidase subunit I) mitochondrial marker. Two 638 bp sequences were obtained and compared to COI

sequences present in the GenBank database. We obtained an identity of 99-100% to sequences of *Crassostrea gigas* specimens from the native area of the species (Pacific Ocean - China and Japan). During this study no Black Sea native oyster species were found.

We need to conduct further studies in order to determine whether *Crassostrea gigas* will manage to reproduce and develop larger populations under the Black Sea special conditions and the ecological implications. Do we need to take action or just enjoy it?

Key words: *Magallana gigas*, *Crassostrea gigas*, alien, barcoding, COI, ecological implications

INVASION BY THE ALIEN SPECIES OF RIVER MARGINS. CASE STUDY: ARIES RIVER (TRANSYLVANIA, ROMANIA)

Marilena Onete[1], *Jodey Peyton*[2], *Oliver Pescott*[2], *Owen Mountford*[2], *Minodora Manu*[1], *Roxana Nicoară*[1]

[1] Institute of Biology Bucharest of the Romanian Academy, Department of Ecology, Taxonomy and Nature Conservation, Spl. Independentei 296, Sector 6, 060031, București, Romania; marilena.onete@gmail.com
[2] Centre for Ecology and Hydrology, Maclean Building, Benson Lane, Wallingford, OX10 8BB, UK

Arieș River crosses Transylvanian region and flow into Mureș River. Within conservation biology and nature conservation, river valleys are mostly regarded as ecological corridors, their riparian areas are the most important structural and functional elements connecting aquatic and terrestrial habitats and also the subject of alien/non-native/exotic plants invasion. The richness and diversity of vegetation within the Arieș catchment was studied over decades but are lacking studies focused on the slopes, banks and floodplain of the Arieș River Valley. We recorded the species composition and percentage cover of the vegetation in 2 m^2 plots from two locations from Arieș floodplain. In every plot we inventoried the vascular plant species within four natural height layers. The statistical analysis and spatial distribution highlighted that the most representative layer is 1-5 m height comprising all the alien species recorded in the area. The species density in most of the plots allows only a few native shrubs and trees to survive, the only survivors being old trees established before the mass development of the alien species. The main impact upon the old trees is heavy metal pollution and cutting by humans for fire or other purposes. The inventoried herbaceous perennial species are clonal plants; their predominant vegetative reproduction makes them more resistant to the disturbance occurring in the riparian area, including water and soil pollution. The great density of the alien species on

Arieș River margins and the small number and density of native plant species indicate that Arieș River acts as an invasion corridor for the entire river system and the surrounding areas (some of them being protected).

Key words: invasive species, river margins, riparian habitats, Transylvania, Romania

TOPIC 3: THE DANUBE RIVER AS INVASIVE ALIEN SPECIES CORRIDOR

Priority species for the Danube Region, impact on threatened species, specificity of biological invasions in Lower, Middle and Upper Danube River sections

INVASIVE ALIEN SPECIES OF EU CONCERN IN THE DANUBE REGION – TESTING OF THE SMARTPHONE APPLICATION DEVELOPED BY THE EC JRC

Milcho Todorov[1], *Rumen Tomov*[2], *Kostadin Ignatov*[3], *Dan Cogălniceanu*[4], *Momir Paunović*[5], *Teodora Trichkova*[1]

[1] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; todorovmilcho@gmail.com; trichkova@gmail.com
[2] Department of Plant Protection, Faculty of Agriculture, University of Forestry, 10 Kliment Ohridski Blvd., 1797 Sofia, Bulgaria
[3] Biological Faculty, Sofia University 'St. Kliment Ohridski', 8 Dragan Tsankov Blvd., 1164 Sofia, Bulgaria
[4] Faculty of Natural and Agricultural Sciences, 'Ovidius' University of Constanța, Aleea Universității nr. 1, corp B, 900470 Constanța, Romania
[5] University of Belgrade, Institute for Biological Research 'Siniša Stanković', Bulevar Despota Stefana 142, 11060 Belgrade, Serbia

The aim of our study was to test the practical use of the smartphone application 'Invasive Alien Species Europe' developed by the European Commission's Joint Research Centre (JRC) in the Lower Danube River basin (Bulgaria, Romania, Serbia). This included the following steps: 1) Identification of suitable test sites and related stakeholders; 2) Planning and organisation of information and field testing campaigns with stakeholders at the identified sites; and 3) Documenting practical experience about the use of the app, collection of data, and users' feedback.

Eleven information and field testing campaigns were organised, 52 sites were visited, and 235 stakeholders (scientists, students, authorities, and citizens) were involved in the testing. At most of the sites (in the field) different sampling techniques were applied for collection of the samples and demonstrations, while at some of the sites (botanical and zoological gardens, and parks) only observations were done. A total of 59 feedback forms were collected from the participants.

Nine invasive alien species of EU concern were recorded during our study. Of them, three species (*Orconectes limosus, Pseudorasbora parva* and *Perccottus glenii*) were found in the field, one species (*Trachemys scripta*) was found only in ponds in parks and urbanised areas, while the others were observed in the zoo and botanical gardens. A total of 37 sightings were recorded with the smartphone application. Other 20 alien and translocated species were observed during the field testing, of which, most frequent were *Lepomis gibbosus* and *Corbicula fluminea*. Our results showed that the smartphone application may be an effective platform for collecting data on the invasive alien species in the Danube Region by the citizens. Based on the feedback of participants, some improvements were recommended, such as: expanding of language options; extension of the species list by including species of regional concern;

and some technical improvements. The results also demonstrated the need of raising of public awareness on the invasive alien species in the region.

Key words: Citizen science, smartphone application, invasive alien species of EU concern, Danube Region

Acknowledgements: The study was funded by the European Commission under the project: 'Pilot-study (data collection) on invasive alien species in the Danube Region with a smartphone application developed by the JRC'.

NVASIVE ALIEN PLANTS FROM PROTECTED AREAS ALONG THE DANUBE RIVER

Ioana Simion[1], *Violeta Boruz*[1]

[1]University of Craiova, "Al. Buia" Botanical Garden, 32 C-tin Lecca St., Craiova, Romania; si261968@gmail.com

The paper presents the invasive plant species from Sites of Community Importance (SCI) from the Carpathian-Balkan sector of the Danube.

An essential role in the penetration and spread of invasive alien species in this sector and from this sector to the interior of the country they have the floods. Largely, the floral diversity in this sector (and therefore the diversity of invasive alien species) depends on the connection between the two very different components of the fluviatile system: river fairway and flooded area. So, the floodplain represents for the Danube a flow rate and chemistry regulator and a suspension filter, and the waters of the Danube are the source of mineral and biogenic elements for floodplains, which lead to plant and animal revival. How much the waters of the Danube are bigger and stagnate for longer on the largest areas of floodplains, the more it generates a larger and more diversified invasion.

Key words: invasive species, Danube, biodiversity, protected areas

TOPIC 4: INVASIVE ALIEN SPECIES IMPACT

Environmental impact, impact on ecosystem services, socioeconomic impact and impact on human health; pestsand pathogen

THE ROLE OF INVASIVE HYDROPHYTES IN STRUCTURING MACROPHYTE ASSEMBLAGES IN THE NEWLY-FORMED GRAVEL PIT LAKES

Dušanka Cvijanović[1], *Bojan Damnjanović*[2], *Maja Novković*[1], *Aleksandra Vesić*[3], *Milica Živković*[1], *Ana Anđelković*[4], *Snežana Radulović*[1]

[1] Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad, Trg Dositeja Obradovića 2, 11000 Novi Sad, Republic of Serbia; dusanka.cvijanovic@dbe.uns.ac.rs
[2] Higher Medical and Business-Technological School of Applied Studies Šabac, Hajduk Veljkova 10, 15000 Šabac, Republic of Serbia
[3] Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Njegoševa 12, 11001 Belgrade, Republic of Serbia
[4] Institute for Plant Protection and Environment, Teodora Drajzera 9, 11040 Belgrade, Republic of Serbia

Newly-formed aquatic habitats, such as gravel pit lakes in river floodplains are usually colonised by macrophyte species few years following the gravel extraction. Together with native species, invasive hydrophytes may also create stable stands and therefore affect vegetation composition. The aim of this study was to determine the potential influence and correlation between the total cover of invasive macrophyte species and macrophyte vegetation metrics (Shannon diversity index, species richness, total macrophyte cover, number of macrophyte functional groups, number of charophyte taxa and relative charophyte cover) in gravel pit lakes along the Drina River floodplain (Serbia). Field research was carried out on 49 survey sectors, distributed at 14 newly-formed gravel pit lakes (5-10 years after the final gravel extraction), during the summer months of 2015 and 2016. Vegetation data was collected in accordance with the Pan-European standard for the sampling of macrophyte vegetation in lakes, using the UKTAG LEAFPACS (Lake Assessment Methods, Macrophyte and Phytobenthos). Invasive aquatic plants were recorded on 12 gravel pit lakes, including 38 surveyed sectors, with the relative cover value of up to 20 %. Three alien hydrophytes were recorded: *Elodea canadensis* Michx, *Elodea nuttallii* (Planchon) St John and *Vallisneria spiralis* L. The most frequent and abundant one was *Vallisneria spiralis*, which was recorded on 31 surveyed sectors. Apart from the relative charophyte cover and the number of macrophyte functional groups, which showed no correlation, all other macrophyte metrics showed weak to moderate positive correlation with the relative cover of invasive species. This finding suggests that the establishment of macrophyte vegetation may not be significantly affected by invasive species at this early successional stage.

Key words: macrophytes, gravel pit lakes, invasive hydrophytes, species richness, diversity

ENVIRONMENTAL AND SOCIOECONOMIC IMPACT OF ALIEN PLANTS IN TURKEY

Ayşe Yazlık[1,2], Jan Pergl[1], Petr Pyšek[1,3]

[1]The Czech Academy of Sciences, Institute of Botany, Department of Invasion Ecology, CZ-252 43 Průhonice, Czech Republic; ayseyazlik@gmail.com
[2]Department of Plant Protection, Faculty of Agriculture and Nature Sciences, Düzce University, 81620 Düzce, Türkiye
[3]Department of Ecology, Faculty of Science, Charles University, Viničná 7, CZ-128 44 Prague, Czech Republic

Some alien species have serious negative environmental and socioeconomic impacts. However, for many alien species information on their impacts is missing, and some countries are still understudied in this respect. In the presented study, we aimed to evaluate environmental and socioeconomic impacts of alien plant species in Turkey, to provide basis for precautionary approach and risk assessment from plant invasions in this country. For this purpose, we evaluated 51 plant species using the Generic Impact Scoring System (GISS), based on records of individual species' impacts in 125 articles and 15 database/factsheets (e.g.; ISSG, USDA, CABI etc.). Impacts were classified into 12 categories and, within each category; the impact was assessed on a six degree scale. Environmental impacts were recorded for 80% and socioeconomic impacts for 78% of the species assessed. Furthermore by taking into account the actual distribution of the assessed species, we evaluated the regional distribution of potential impacts in Turkey. In terms of geographical regions, the Black Sea region harbours 34 species with impacts, Marmara 28, Mediterranean region 21, Aegean region 17 and East Anatolia, Central Anatolia and South East Anatolia harbour 12 species each. The species that have negative impact on forestry are only found in three regions and 21 species are detected as agricultural weeds.

Key words: alien species, environmental impact, GISS, socioeconomic impact, regional distribution

THE TREE OF HEAVEN (*AILANTHUS ALTISSIMA*): INDICATING THE HEAVEN OR HELL IN THE ROMANIAN CITIES

Marilena Onete[1], Larisa Florescu[1], Mirela Moldoveanu[1], Rodica Catana[1], Minodora Manu[1]

[1]Institute of Biology Bucharest of the Romanian Academy, Department of Ecology, Taxonomy and Nature Conservation, Splaiul Independenței 296, Sector 6, 060031, Bucharest, Romania; marilena.oonete@gmail.com

Ailanthus altissima (Mill.) Swingle (Fam. Simaroubaceae) originating from China has broad distribution in our days. A comprehensive review of the literature highli-

ghted that *A. altissima* is affected mainly by site fertility, is extremely stress tolerant (elevated air and soil temperature, gas emissions, dust, drought, air pollutants, nutrient deficiencies, and soil compaction), has morphological plasticity in response to varying soil conditions, is successional pioneer species, develops allelopatic effects, therefore spreading preferentially in urban areas. The species is used for: ornamental, afforestation and reforestation of „difficult sites", plantations for: culture of silkworms, fuel wood, fodder (goats and cattle), papermaking, and extracts for pharmaceutical, insecticide, acaricide, herbicide.

First recorded in Romania in 1866, the mapping of its distribution shows the rapid spread in entire country in urban-rural, margins of the rivers, cliffs, etc. In Bucharest is mentioned from 1943 spreading into the entire city. The impact on native plants and animal species diversity is high, and where forming compact stands the entire ecosystem is highly affected. Based on CICES Scheme (main categories of ecosystem services, class categories, class types, individual entities, associated ecosystem service output), biodiversity and human health we detailed the impact of *A. altissima* on ecosystem services.

Key words: *Ailanthus altissima*, distribution, ecological characteristics, Bucharest, urban habitats, ecosystem services

TOPIC 5: INVASIVE ALIEN SPECIES PREVENTION AND MANAGEMENT

Early detection and rapid eradication, surveillance systems; risk assessment and horizon scanning; control measures; restoration of damaged ecosystems; education, citizen science, strategies, policy and legislation; IAS networks and information systems, databases, data planning and management

TOPIC 6: MANAGEMENT AND SHARING OF IAS DATA

IAS networks and information systems, databases, data planning and management

PARTICIPATORY MANAGEMENT OF THE INVASIVE SPECIES *AILANTHUS ALTISSIMA* AND *AMORPHA FRUTICOSA* IN THE LOWER SIRET FLOODPLAIN PROTECTED AREA

Cristiana-Maria Ciocănea[1], *Athanasios-Alexandru Gavrilidis*[1], *Steluţa Manolache*[1], *Laurenţiu Rozylowicz*[1]

[1]University of Bucharest, Centre for Environmental Research and Impact Studies, N. Balcescu Blvd, No.1, Sector 1, 010041, Bucharest, Romania; cristianamaria.ciocanea@g.unibuc.ro

Invasive alien species represent one of the main threats to biodiversity and related ecosystem services, with serious negative ecological, economic or health consequences on the environment. The risks of IAS may intensify due to increased global trade, transport, tourism and climate change.

The paper focuses on the experience of the awareness campaign implementation that aimed to involve local communities in the management of invasive species as false indigo-bush (*Amorpha fruticosa)* and heaven tree (*Ailanthus altissima*) in Lower Siret Floodplain protected area.

Natura 2000 site ROSPA0071 Lower Siret Floodplain is located in Southeastern Romania, overlapping Brăila, Galaţi and Vrancea counties. The protection area includes natural habitats such as sandy beaches, rivers, lakes, marshes, peatlands, natural meadows, steppe areas, crops, arable land, pastures and deciduos forests, and hosts several species of mammals, reptiles, amphibians, fish and insects of community importance, protected at European level. The protected areas is threatened by the spread of invasive alien species (*Robinia pseudoacacia, Ailanthus altissima, Amorpha fruticosa, Gleditsia triacanthos, Rhus typhina* etc.) that gradually replace the native vegetation, altering the habitats and their capacity to sustain species of conservative interest.

The environmental conservation is vital for a sustainable environment, but to be succesful the process must actively involve the local communities in the process. The paper brings valuable data (distribution and abundance of *Ailanthus altissima* and *Amorpha fruticosa,* database available online for authorities and other stakeholders), challenges and good practices of participatory management of invasive species in Lower Siret Floodplain protected areas (action plan, online solution for reporting IAS, suitable awareness materials, voluntary Code of conduct, certification scheme).

The information may be used for improving the efficiency of IAS management and conservation measures in protected areas and give the authorities and custodes a real perspective on the communities perceptions and attitudes.

Key words: invasive species, IAS management, participatory management, *Ailanthus altissima*, *Amorpha fruticosa*, protected areas

MANAGEMENT OF *CYDALIMA PERSPECTALIS* (WALK.) (LEPIDOPTERA: CRAMBIDAE) POPULATIONS IN THE HISTORIC PARK OF THE MONASTERY BEOCIN IN SERBIA

Milka Glavendekić[1], *Aleksandra Konjević*[2], *Aleksandar Lisica*[1], *Dejan Skočajić*[1], *Nadežda Stojanović*[1], *Mirjana Tešić*[1], *Ervin Vukasović*[1]

[1]University of Belgrade-Faculty of Forestry, Department of Landscape Architecture and Horticulture, Kneza Višeslava 1, 11030 Belgrade, Serbia; milka.glavendekic@sfb.bg.ac.rs
[2]Faculty of Agriculture, University of Novi Sad, Trg Dositeja Obradovića 8, 21101 Novi Sad, Serbia

Alien invasive insects are following their host plants all over the world. Trade, transport and plants for planting are supposed to be among major pathways for introduction of alien species. Among alien insects of major concern in forests and green infrastructure, it is estimated that about 10% are invasive species with significant ecological and economic impact. *Cydalima perspectalis* (Walk) (Lepidoptera: Crambidae) was for the first time recorded in Serbia in 2014 and within next three years it has expanded its range to almost entire country. Box tree (*Buxus sempervirens* L.) is commonly grown in parks and gardens in Serbia, which is favourable for expansion of alien invasive species.

Management strategy for control of *C. perspectalis* shall be explained as the case study of the park of the Monastery Beočin. Park covers the area of 0.5 hectares and it is part of the National Park Fruška Gora. Park, designed in French geometric style, was established at the beginning of 20th century, with sloping paths, conifer and broadleaf trees and box tree bordures. After first defoliation of box tree caused by *C. perspectalis* in 2016 and total defoliation in April 2017, cultural measures were applied in two consecutive years (2017 and 2018) including, pruning and revitalization of box tree bordures. In order to achieve efficient control, training of professionals, public awareness and legislation were improved. Research on biological control agents has been conducted and seven species of natural enemies were observed belonging to Heteroptera, Diptera, Hymenoptera and several species of birds. After testing suitable plant protection products, was applied integrated pest control (IPM). Control of efficacy of treatments and monitoring of pest populations were done during the whole vegetation periods. Nuns of the Monastery Beočin, citizens and employees of local companies managing urban green were trained and engaged in pest management.

Key words: *Cydalima perspectalis, Buxus sempervirens*, historic park, IPM, natural enemies

PENTATOMIDAE OF ECONOMIC IMPORTANCE IN ROMANIA – FIRST DNA BARCODING TRIALS

Roxana Ciceoi[1], *Adriana Radulovici*[2]

[1]Laboratory of Diagnose for Plant Protection, Research Centre for Study of Food and Agricultural Products Quality, University of Agronomic Sciences and Veterinary Medicine, Bd. Mărăşti 59, Sector 1, 011464, Bucharest, Romania; roxana.ciceoi@gmail.com
[2]Centre for Biodiversity Genomics, University of Guelph, Guelph, Canada

DNA barcoding became an extensively used identification method for taxonomists, especially for a number of regulated pests and invasive species, as demonstrated by the EPPO standard PM7/129(1). During a first trial, 19 samples of *Pentatomidae* species were analyzed, in order to confirm both the species morphological identification and to add the sequences belonging to Romanian specimens in the Barcode of Life Database (BOLD). At the time of data analysis, 7256 *Pentatomidae* specimens with barcodes were available for blast in BOLD, belonging to 433 species. No *Pentatomidae* records from Romania were previously existing in the database. 19 specimens belonging to species of economic importance in Romania were identified by DNA barcoding method, of which nine *Halyomorpha halys*, three *Dolycoris baccarum*, two *Graphosoma italicum,* two *Aelia sp.* and one specimen of *Acrosternum heegeri*, *Nezara viridula* and *Rhaphigaster nebulosa.* By this method, *Acrosternum heegeri*, which was initially considered as *Nezara viridula* was sequenced for the first time in BOLD, while another species, close to the *Stagonomus* genous still needs to be identified.

Key words: *Pentatomidae*, DNA barcoding, Romania, Barcode of Life Database (BOLD), *Acrosternum heegeri*

MONITORING OF THE QUARANTINE PHYTOPLASMIC DISEASES ON THE VINE IN BULGARIA IN THE PERIOD 2012–2018

Zhelyu Avramov[1], *Mariana Laginova*[2], *Dora Panayotova*[2], *Ivanka Ivanova*[2], *Marko Mihaylov*[1]

[1] Department of Plant Protection, Faculty of Agriculture, University of Forestry, 10 Kliment Ohridski Blvd., 1797 Sofia, Bulgaria; zhelu.avramov@gmail.com
[2] Central Laboratory for Plant Quarantine, Bulgarian Food Safety Agency, 120 Nikola Mushanov Blvd., P.O. Box 158, Sofia, Bulgaria

In recent years, new industrial vineyards have been established in Bulgaria with European and traditional Bulgarian varieties. In support of producers and to prevent the possible spread of new quarantine and economically important phytoplasmic diseases, the Bulgarian Food Safety Agency (BFSA) developed a monitoring programme.

During the period 2011–2018, all industrial wine growing regions in the territory of Bulgaria were surveyed. A total of 2150 plant samples were taken from 20 regions in autumn and spring of each year to be tested at the Central Laboratory for Plant Quarantine (CLPQ). In addition, 709 specimens of different species of cicadas – phytoplasma vectors, such as: *Scaphoideus titanus*, *Reptalus* spp., *Hyalestes* spp., and *Empoasca* spp., were trapped by yellow sticky traps or with an exhauster. The samples were extracted from the vegetative tissue (leaves, leaf stems and shoots) and each predetermined individual was examined in buffer (CTAB, 3%) for total DNA extraction (pH 8.3). Laboratory analyses by Nested PCR with two pairs of universal primers (P1R7 / U3U5) followed by PAGE for final identification of the species status of the established phytoplasma infection were performed. The results obtained were compared to those from previous data by 2012.

During the observed period, the Bois Noir disease was identified in 137 plant samples and 21 cicadas, which are also potential vectors of the Grapevine yellows diseases. The Grapevine Flavescence doree phytoplasma, a quarantine phytoplasma for Bulgaria, was detected neither in the analysed symptomatic and asymptomatic plants nor in its vector, the cicada *S. titanus*. During the study period, *S. titanus* increased its range in the Northern Bulgaria. Our results showed the need of increased attention and preventive measures in the areas for production of grapevine planting material.

Key words: Quarantine grapevine yellows, monitoring, Bulgaria

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THE MISCONCEPTION OF PUFFERFISH CONSUMPTION IN GREECE THROUGH SOCIAL MEDIA SENTIMENT ANALYSIS

Nikolaos Doumpas[1], *Ioannis Giovos*[1], *Stefanos Kalogirou*[2]

[1]iSea, Environmental Organisation for the Preservation of the Aquatic Ecosystems, Ochi Av., 11, 55438, Thessaloniki, Greece; nikolaos.doumpas@isea.com.gr
[2] Hellenic Centre for Marine Research, Hydrobiological Station of Rhodes, 85100 Rhodes, Greece

Mediterranean Sea is the most heavily invaded ecoregion of the world. Among the 22 coastal countries in the Mediterranean Sea, Greece is one of the most highly impacted, accounting 613 marine alien species. To our knowledge, six species of the Tetraodontidae family (commonly known as puffefish) are present in the eastern Mediterranean Sea. According to the current EU legislation (853/2004/EC; 854/2004/

EC), fishery products of the Tetraodontidae family are prohibited from European markets because of the presence of the potentially lethal neurotoxin tetrodotoxin (TTX) in the tissues. One of the most wide-spread and invasive species is *Lagocephalus sceleratus* (Gmelin, 1789) and since its first record of, back in 2003, Greek governmental bodies and research institutes launched awareness campaigns in media and distributed informative materials to inform citizens and fisheries organizations about the toxicity and the underlying risk related to the consumption of this species. Yet, more than 15 incidences of human intoxication have been reported from the eastern Mediterranean countries so far, most recently from Cyprus and Greece. Social media have been shown to be a highly valuable fora among sea users, especially recreational fishers, that can be used to collect information on the public opinion on food security. We hereby present a sentiment analysis of comments retrieved from social media under posts of *Lagocephalus* spp. catches to evaluate the public opinion and knowledge (primarily the recreational fishing community) on food security issues associated to the presence of a non-indigenous species, *L. sceleratus* in Greece. Most importantly, in ≈ 25% of the total 130 comments evaluated from Facebook posts, users stated that the species can be consumed if is prepared properly as *fugu* dish in Japan, even though the same species is prohibited to be prepared as fugu in Japan. The results of this study signifies the importance of awareness campaigns to avoid intoxication of the population in Greece and elsewhere and raises important issues on food security.

Key words: invasive species, Tetraodontidae, food security, safe consumption, content analysis, public health

CONTRIBUTION OF ESENIAS-TOOLS PROJECT TO IAS AWARENESS RAISING IN THE ESENIAS REGION

Rumen Tomov[1], *Teodora Trichkova*[2], *Vladimir Vladimirov*[2], *Ahmet Uludağ*[3], *Argyro Zenetos*[4], *Dan Cogălniceanu*[5], *David Finger*[6], *Sasho Trajanovski*[7], *Sonja Desnica*[8]

[1] Department of Plant Protection, University of Forestry, 10 Kliment Ohridski Blvd., 1797 Sofia, Bulgaria; rtomov@yahoo.com
[2] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (BAS), 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; trichkova@gmail.com
[3] Faculty of Agriculture, Çanakkale Onsekiz Mart University, Çanakkale, Turkey
[4] Hellenic Centre for Marine Research (HCMR), Institute of Marine Biological Resources and Inland Waters, 19013 Anavyssos, Greece
[5] Faculty of Natural and Agricultural Sciences, Ovidius' University of Constanţa, Constanţa, Romania
[6] Reykjavik University, School of Science and Engineering, Reykjavik, Iceland
[7] PSI Hydrobiological Institute Ohrid, Ohrid, FYR Macedonia
[8] State Institute for Nature Protection, Zagreb, Croatia

The project: *East and South European Network for Invasive Alien Species – A tool to support the management of alien species in Bulgaria* (ESENIAS-TOOLS) was implemented in the period 2015-2017. The project was funded by the Financial Mechanism of the European Economic Area 2009-2014, within the Programme BG03 Biodiversity and Ecosystem Services, and aimed at networking and development of invasive alien species (IAS) tools within the frame of ESENIAS to support the management of alien species in Bulgaria and in the overall region. Eleven partners (environmental agencies, universities, research institutions) from eight countries (Bulgaria, Greece, Croatia, Serbia, Romania, Turkey, Iceland, and FYR Macedonia) participated in the project. One of the main objectives of the project was to raise the public awareness on IAS in the ESENIAS region. Here we present the project outcomes in the implementation of this objective at national and regional level.

Within the frame of the project, a permanent exhibition of IAS was prepared and opened at the National Museum of Natural History – Sofia, BAS. A 'Guide to invasive alien species of European Union concern' was prepared and published in Bulgarian. An international training course 'Impact of invasive alien species on biodiversity and ecosystem services in extreme environments' was organised in Sofia. Several scintific forums were held, such as: The 7th ESENIAS Workshop with Scientific Conference 'Networking and Regional Cooperation Towards Invasive Alien Species Prevention and Management in Europe' and The 4th Danube Region Invasive Alien Species Network (DIAS) meeting 'Cooperation towards the IAS Strategy in the Danube Region'. The project results were published in 6 books, 57 articles in scientific journals and 89 abstracts in scientific volumes. Information about all ESENIAS activities and project outcomes has been published at the ESENIAS website (www.esenias.org). All these activities aim to provide relevant

information about IAS in order to raise awareness among a wide range of stakeholders (scientists, teachers, decision-makers, managers, students, and the general public) and to facilitate the implementation of the Regulation (EU) No 1143/2014 in Bulgaria and in the ESENIAS region.

Key words: ESENIAS network, ESENIAS-TOOLS project, outcomes, awareness raising activities

PUBLIC ATTITUDES TOWARDS INVASIVE ALIEN SPECIES IN BULGARIA

Rumen Tomov[1], *Teodora Trichkova*[2]

[1] Department of Plant Protection, Faculty of Agriculture, University of Forestry, 10 Kliment Ohridski Blvd., 1797 Sofia, Bulgaria; rtomov@yahoo.com
[2] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (IBER-BAS), 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; trichkova@gmail.com

Bulgarian biodiversity and economy are threatened by invasive alien species (IAS). Most of the pathways of introduction and spread of the IAS are associated with human activities. Horticultural and pet and aquarium escapees are one of the most frequent pathways for introduction of IAS. Bulgaria has many exotic gardens, zoos, fish farms and other resources that allow newly introduced species to become established. Other common pathways are the transport of species as contaminants with stocking and fish-farming materials, as well as the stowaway transport with vessels and equipment. Public awareness is crucial for the prevention of introductions and spread of IAS, which is more cost-effective than measures taken following their establishment in a new location.

Questionnaire surveys were conducted in Bulgaria, with the aim to understand how much the participants are acquainted with the IAS issues and the European Union's (EU) Regulation 1143/2014. The respondents were asked to make judgements about their own level of knowledge about the impact, pathways, management and regulatory framework related to IAS. About 300 professionals (scientists, phytosanitary inspectors, ecologists from municipalities, and representatives of governmental environment agencies and NGOs) and non-professionals (citizens and students) participated in the surveys.

The results showed that most of the professionals know about IAS and some of the problems they cause. The awareness among non-professionals was rather poor. More than 80% of them were not aware of the IAS impact and pathways of introduction, as well as the risk posed by trade and keeping of exotic plants and pets, and their intentional or unintentional release into the environment. Necessary activities,

aiming at changing of public attitudes towards IAS, in order to prevent their introduction and spread in Bulgaria are discussed.

Key words: Citizens, invasive alien species, pathways of introduction and spread, prevention, awareness raising

Acknowledgements: The study was conducted within the projects: 'Pilot-study (data collection) on invasive alien species in the Danube Region with a smartphone application developed by the JRC', funded by the European Commission; COST Action FP1002 'Pathway Evaluation and pest Risk Management In Transport (PERMIT)'; and 'Development of Bio-Resources Extension Service (BIOREX) at University of Forestry'.

TOPIC 7: OTHER TOPICS

GENOTOXIC EFFECTS OF *RHAMNUS CATHARTICA* ON THE HUMAN BLOOD LYMPHOCYTES

Meliha Merve Hız[1-2], *Gülsüm Akkuş*[2], *Damla Yüksel Balım*[1,3]

[1] Canakkale Onsekiz Mart University, Faculty of Medicine, Department of Medical Biology, 7020, Çanakkale, Turkey; mervemeliha@comu.edu.tr
[2] Canakkale Onsekiz Mart University, Graduate School of Health Sciences, Department Medical System Biology, 7020, Çanakkale, Turkey
[3] Mersin University, Faculty of Medicine, Department of Medical Biology, 33343, Mersin, Turkey

Rhamnus cathartica (RC), a prevalent invasive shrub in relict woodlands, it has become naturilazed in North America. This species's leaves and fruits have been used for their diuretic, depurative, laxative effect upon the body for years. Evidence from to the date shown that the *Rhamnus cathartica* has reduced toothache, and it also has antioxidant and antimicrobial activity whereas the cytotoxic effect of the plant may be responsible for the emergence of the antimicrobial effect. *Rhamnus cathartica* accepted as safe by German Comission E, in contrast we have a suspicion doubt its antibicrobial effects may be lean on its genotoxic effect.

The aim of the present study was to evaluate the genotoxic and cytotoxic potential of the water and methanolic extract obtained from the *Rhamnus cathartica leaf* in peripheral lymphocytes culture by using chromosomal aberration test and micronucleus assay for 24- and 48-hour treatment period.

Three different concentartion of RC extract 1 mg/ml, 2 mg/ml and 4 mg/ml were selected as treatment group; MytomisinC as positive standart and distilled water is use as negative control. In micronucleus assay, dose dependend micronucleus formation have been increased at all concentrations and at all treatment periods (26.87±19; 24±14.52; 11.33±6.5 for methanol extract; 10±1.63 for MMC; 1.66±0.57 for NC). In addition, significant enhance in frequency of micronucleated polychromatic erythrocytes and DNA damage, when compared to the group treated only with MMC. Under the conditions of this study, it has been demonstrated that the *Rhamnus cathartica* extract is genotoxic at the concentrations used.

Key words: *Rhamnus cathartica*, genotoxicity, human peripheral blood lymphocytes, chromosome aberration, sister chromatin exchange, micronucleus

THE GENOTOXIC EFFECTS OF *CHRYSANTHEMUM CINERARIIFOLIUM* EXTRACT ON THE HUMAN BLOOD LYMPHOCYTES

Meliha Merve Hız[1], *Sibel Oymak*[2], *Gülsüm Akkuş*[3], *Begüm Dermenci*[3]

[1] Çanakkale Onsekiz Mart University, Faculty of Medicine, Department of Public Health 7020, Çanakkale, Turkey; mervemeliha@comu.edu.tr
[2] Çanakkale Onsekiz Mart University, Faculty of Medicine, Department of Medical Biology, 7020, Çanakkale, Turkey
[3] Çanakkale Onsekiz Mart Universitesi, Graduate school of health sciences, Medical System Biology, 7020, Merkez, Çanakkale, Turkey

Medical daisy (*Matricaria recutita)* generally use in the folk and traditional medicine by its antimicrobial, antispasmodic, anxiolytic, immunomodulatory and sedative purpose via therapeutically active compounds as sesquiterpenes, flavonoids, coumarins, and polyacetylenes, etc. Pyrethrum (*Chrysanthemum cinerariifolium*), which is attracted attention by its similarity to medical daisy (*Matricaria recutita*), is widely use as natural insecticide. Due to pyrethrum similarity to medical daisy may lead to any mixing or unintentional accidental consumption.

The aim of this study was to investigate the genotoxic and antigenotoxic effects of pyrethrum leaf extract using chromosome aberration (CA), nuclear abnormalities (NA) and micronucleus (MN) formation test systems in peripheral lymphocytes cell culture (LCC) test.

In this study, the genotoxic potential of *Chrysanthemum cinerariifolium* extract has been applied to ten different samples (5 males and 5 females) in 3 different doses (1/9-1/4-1/1, pyrethrum /medical daisy) with negative and positive control (MMC, 0.20 μg/mL) for 24- and 48-hour treatment period. To understand the difference between doses the chromosomal abnormalyties and micronucleus were counted 1000 cells per group including controls

Our preliminary results showed that pyrethrum leaf extract (%10 pyrethrin) showed a cytotoxic effect by micronucleus formation depending on dose and time for 3 individuals' samples. However, it did not decrease the binucleate, tetranucleate formation in 24-hour treatment period.

In addition, pyrethrum plus /medical daisy as a mixture induced the MN at the highest concentrations for 1/2 doses at the 24-hour treatment time. Further, the micronucleus assay, shown that the gradual increase of pyrethrin/daisy concentration increase micronucleus formation for $^1/_{10}$, $^1/_5$ and $^1/_2$ doses as 8.8 ± 1.59, 18.3 ± 2.2, 29.75 ± 2.9 respectively. In addition, pyrethrum leaf extract synergically induced SCE

and CA in 24-hour treatment period. *Matricaria recutita* leaf extract had no cytotoxic effect in 24-hour treatment. Average MN-values of negative control group were significantly lower than all treatment groups.

Key words: *Matricaria recutita, Chrysanthemum cinerariifolium*, genotoxicity, human peripheral blood lymphocytes, chromosome aberration, micronucleus

POSTERS

TOPIC 1: INVASIVE ALIEN SPECIES TRAITS AND TRENDS

Invasive alien species introductions and spread, biological and ecological characteristics; characteristics of recipient environment; invasive alien species and climate change

TOPIC 2: VECTORS AND PATHWAYS FOR INVASIVE ALIEN SPECIES INTRODUCTIONS

Trade, transport, horticulture, aquaculture, agriculture, forestry, hunting, etc.

SILPHIUM PERFOLIATUM L. IN THE FLORA OF THE ROMENSKO-POLTAVSKY GEOBOTANICAL REGION

Tetyana S. Dvirna[1]

[1]M. G. Kholodny Institute of Botany, NAS of Ukraine, Tereschenkivsa St., 2,Kyiv, 01601, Ukraine; dvirna_t@ukr.net

Silphium perfoliatum L. is the kenophyte (North American origin), ergasiophyte. The species has been cultivated since 1971 on the M.I.Vavilov Poltava Research Station and Research Station of Medicinal Plants (vill. Berezotocha, Poltava Reg.) as ornamental and forage plant. On the territory of the Romensko-Poltavsky Geobotanical Region as escaped plants noted in 90-th of the XX c.

At present we have discovered tree localities of the species in the Region beyond places of its cultivation. The most numerous is the localitet in the Poltava Dendrological Park in the marginal ecotopes where species sporadically distrubution; show a tendency to incorporation in to the shrubs and rare in forest plant community.

The population of *S. perfoliatum* is characterized by high density, and participation of the generative plants (44 %) in the age spectra.

Key words: *Silphium perfoliatum*, kenophyte, ergasiophyte, Romensko-Poltavsky Geobotanical Region, Ukraine

HIERACIUM AMPLEXICAULE (ASTERACEAE): A NEW CASUAL SPECIES TO THE BULGARIAN FLORA

Vladimir Vladimirov[1]

[1]Department of Plant and Fungal Diversity and Resources, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Acad. Georgi Bonchev Street, Bl. 23, 1113 Sofia, Bulgaria; vladimir_dv@abv.bg

The aim of the poster presentation is to report for the first time the occurrence of *Hieracium amplexicaule* L. (Compositae) as an alien species in the Bulgarian flora. The genus *Hieracium* is notorious for its taxonomic complexity due to its specific reproductive system, including normal sexual reproduction, hybridisation and apomixis. It is one of the largest genera in the Bulgarian flora. So far, no alien *Hieracium* species has been reported for Bulgaria. *Hieracium amplexicaule* has been recently recorded in the Rila Mountains, close to the former King's hunting lodge Sitnyakovo. It is native to Central and South-Western Europe and South-Western Africa. Due to its ornemental appearance, the species has been cultivated for nearly a century in the rock-garden of the hunting

lodge from where it escaped to the adjacent territories. The most likely means of escape is either by seeds from the rock garden or from cut stems with ripe seeds thrown in the nearby forest after cleaning the rockery or by both means. Only a few dozens of individuals have been observed in certain years along a forest road in the margin of a forest of *Picea abies*. The plants flower and set seeds. The species should be considered as a casual taxon in the Bulgarian flora until a well established population is observed.

Key words: Alien plants, Bulgarian flora, Compositae, Rila Mountains

Acknowledgements: This work has been partly financially supported by the Bulgarian National Science Fund under the project '*Flora of the Republic of Bulgaria, vol. 12: Biological diversity in Asteraceae subfam. Carduoideae and Cichorioideae*', Contract DN01/7 of 16.12.2016.

COMPETITION BETWEEN *AMBROSIA TRIFIDA* L. AND *AMBROSIA ARTEMISIIFOLIA* L.

Aleksandra Savic[1], Danijela Pavlovic[1], Dragana Bozic[2], Sava Vrbnicanin[2]

[1]Institute for Plant Protection and Environment, Teodora Drajzera 9, Belgrade, Serbia
[2]University of Belgrade, Faculty of Agriculture, Nemanjina 6, Zemun, Serbia; sava@agrif.bg.ac.rs

In Serbia, *Ambrosia artemisiifolia* L. (AA) is present in high densities and it reduces crop yields.

She is an economically harmful species, which is a strong competitor for natural resources and space. Crop yields can be significantly reduced or completely destroyed. In addition AA, *Ambrosia trifida* L. (AT) is locally present and naturalized in Serbia, especially in the area of central Backa. Its size well exceeds that of AA, reaching a height of 4 m. Considering that AT is currently expanding, it is expected that it will be more competitive than common ragweed once they occupy the same area, not only in crops, but also in natural ecosystems.

The aim of this study was to determine the biomass of AT under competitive interaction with AA. The experiment was conducted using a replacement design model in ratios plants AA:AT (%) as: *a*-100:0; *b*-80:20; *c*-40:60; *d*-60:40; *e*-20:80 and *f*-0:100, in block design, with four replicates. The experiment has two parts where the plants coexist at a low density (10 plants/m^2) and high density (100 plants/m^2). The vegetative parameters (dry mass) of AT were measured in four assessments during 2016 and these results were statistically analyzed.

The average dry weight values ranged between 5.8-8.99 g (1st assessment), 7.413-.01g (2nd assessment), 10.01-13.54g (3rd assessment) and 8.34-17.85g (4rd assessment)

in low density. The values of dry mass in high density ranged between 6.61-8.38g, 8.66-11.79g, 9.88-13.54g and 10.14-16.13g respectively.

The results show that the vegetative mass of AT in high densities is higher compared with low densities (as a result of a more pronounced light competition). The obtained results have shown the competitive capacity of AT and its invasiveness in coexistence with AA.

Key words: *Ambrosia artemisiifolia* L., *Ambrosia trifida* L., competition, replacement design model

Acknowledgements: The authors thank the Ministry of Education, Science and Technological Development of the Republic of Serbia for the support in this investigation (Project III46008).

CONTRIBUTIONS TO THE KNOWLEDGE OF INVASIVE ALIEN PLANT SPECIES IN THE MIDDLE HYDROGRAPHICAL BASIN OF MURES RIVER (ROMANIA)

Oana-Viorica Danci[1], *Sretco Milanovici*[2]

[1] Lucian Blaga University of Sibiu, Faculty of Sciences, 5-7 no, Dr. Ion Rațiu street, 550012, Sibiu, Romania; oana.danci@ulbsibiu.ro

[2] Banat National Museum, Natural Science Department, Huniade Square, no. 1, 300342 Timișoara, Romania; orchids_mils@yahoo.com

The aim of this paper is to inventory the invasive alien plant species in the middle hydrographical basin of Mureș River, Romania and to correlate their presence with the linear transportation infrastructure in the area, specially railway network.

We analysed 32 plots situated on a length of about 80 km on the riverbanks of Mureș River and also situated close to the railway line, on the sector between Simeria City (Hunedoara County) and Bârzava (Arad County), part of them included in the Natura 2000 sites ROSCI0064 Mureș River Defilee and ROSCI0373 Mureș River between Bărnișca and Ilia.

Different species of invasive alien plants were found in every analysed plot but the most frequent were: *Acer negundo, Amorpha fruticosa, Fallopia japonica, Helianthemum tuberosum* and *Echinocystis lobata.* The paper also intends to underline the possible distribution paths and vectors that contributed to the spreading of invasive alien plants in the study area.

Key words: invasive alien plants, railway line, riverbanks, Mureș River

CONTRIBUTIONS TO THE STUDY OF ALIEN AND INVASIVE SPECIES IN SOME PROTECTED AREAS IN MURES COUNTY

Mihaela Sămărghițan[1], *Silvia Oroian*[2], *Corneliu Tanase*[2]

[1]Mureş County Museum, Department of Natural Sciences, 24 Horea Street, RO-540036 Tîrgu Mureş, Romania; msamarghitan@yahoo.com
[2]Department of Fundamental Pharmaceutical Sciences, Discipline of Pharmaceutical Botany, University of Medicine and Pharmacy of Tîrgu Mureş, 38 Gh. Marinescu Street, RO-540139 Târgu Mureș, Romania; oroianslv@yahoo.com

With interest in alien and especially invasive alien species increasing in popularity around the world, and because of the significant impact to biodiversity created by the invasion of alien species to the native species, creating an urgent need for stringent guidelines to control the problem, a study was conducted locally to better understand the impact of these invasive plants.

The paper presents the inventory and chorology of alien and invasive species identified in some of the protected areas in Mureș County.

Natura 2000 sites ROSCI0019 and ROSCI0227 that overlap some of the natural reserves in the Mures County were studied in particular.

The diversity of habitat types present in the studied area enables the presence of invasive species with varying ecological requirements. Although the presence of these species is particularly noticeable near human settlements and heavily ruderalized sites, as a consequence of abandoning agricultural land, invasive species have been identified in various habitat types, especially grasslands and wetlands near watercourses.

Among the identified species, we mention: *Echinocystis lobata, Erigeron annuus* subsp. *annuus, Impatiens glandulifera, Reynoutria japonica, Rudbeckia laciniata, Solidago canadensis, Solidago gigantea* subsp. *serotina* etc. These are some of the species met with high frequency and they often form dense vegetation groups.

The study highlights the origin of these species and the impact they have on the state of conservation of natural habitats. In addition, the most aggressive invasive species and habitat types affected by their spread are noted.

Knowing the presence and distribution of invasive species in a given area enables us to assess the impact they have on the biodiversity of the site and to establish appropriate management measures to preserve local natural habitats.

Key words: alien plants, protected areas, Mureş County

ALIEN PLANTS FROM VACARESTI NATURAL PARK, BUCHAREST, ROMANIA

Eugenia Nagodă[1], *Petronela Camen-Comănescu*[1], *Gavril Negrean*[1], *Sanda Lițescu*[2], *Paulina Anastasiu*[1,2]

[1] University of Bucharest, Botanic Garden "D. Brandza", 32 Sos. Cotroceni, 060114-Bucharest, Romania; eugenia_nagoda@yahoo.com
[2] University of Bucharest, Faculty of Biology, Department of Botany and Microbiology, 1-3 Intr. Portocalelor, 060101-Bucharest, Romania

Văcărești Natural Park is the first and the one urban nature park from Romania, declared with this status in May 2016. For develop a sustainable conservation and to implement protection stategies of biodiversity in this protected area is necessary early detection and monitoring alien species. This area, situated in the S-E part of Bucharest, stretching on 190 hectares, includes swampy areas with reedbeds, ponds on different size and meadows. Despite his location, inside of the city, shelters a significant specific biodiversity: 331 plants species, approximatively 150 species of birds, 13 species of mammals, 12 species of mollusks, 7 species of fishes, 5 species of reptiles, 6 species of amphibians, 111 species of insects. Through all plants, a number of 65 are alien (19.6%) with different status of invasiveness: casual, naturalised or invasive. The alien species belong to 32 families, the richest being Compositae. Almost half of alien plants (46.1%) are therophytes, followed by phanerophytes (30.7%). As native distribution, from America are 33 species (50.7%), followed by Asia (32,3%). In Văcărești Natural Park are 28 species known as invasive plants: *Acer negundo, Ailanthus altissima*, *Ambrosia artemisiifolia*, *Azolla filiculoides*, *Cuscuta campestris*, *Elaeagnus angustifolia*, *Elodea nuttallii*, *Helianthus tuberosus*, *Lycium barbarum*, *Parthenocissus inserta*, *Fallopia japonica*, *Sorghum halepense*, *Xanthium italicum* and other. In this area was for the first time described in 2013, *Portulaca pilosa* a new species for Romania and *Phemeranthus confertiflorus* a new species for Europe. One of the problematic species is *Ambrosia artemisiifolia* which grows very well almost anywhere: in meadows, near water, along the trail, even in the crevices of the concrete dyke. In the NE corner of the park, population of *Ambrosia* is very rich becoming dominant. Even with the facilities of a natural park, some of the alien species, recorded as naturalised or casual, continues to extend the area of distribution in this location, raising their populations, could become in short time invasive. Administration of this protected area must implement certain measures regarding invasive alien species and it is imperative to act soon as possible.

Key words: alien species, invasive species, urban park, Văcăreşti, Bucharest, Romania

THE ALIEN FLORA OF UKRAINE: MAIN RESULTS OF STUDIES

Myroslav V. Shevera[1, 2], *Vira V. Protopopova*[2, 1],
Raisa I. Burda[3], *Liudmyla V. Zavialova*[1], *Oksana O. Kucher*[1]

[1]M.G. Kholodny Institute of Botany, NAS of Ukraine, Tereschenkivska St., 2, 01004, Kyiv, Ukraine; shevera.myroslav@ukr.net
[2]Ferenc Rákóczi II Transcarpathian Hungarian College of Higher Education, Koshut sq., 6, 90200, Berehove, Ukraine
[3]Institute for Evolutionary Ecology, NAS of Ukraine, Lebedeva St., 2, 03143, Kyiv, Ukraine

The first records about alien plant species in the territory of Ukraine is found in floristic editions after 1787. Interest in them has risen steadily. This review has shown that the alien fraction of Ukrainian flora has been identified and studied comprehensively. The main results of these investigations are summarized. Thus, a total richness of alien fraction is about 1.000 species. The structure, typical trends, and regional peculiarities of this component of the Ukrainian flora have been analyzed. The alien floras of some regions, cities and towns, protected areas of Ukraine have been studied. The species composition of some habitats, partial floras with a high abundance of non-native plants, tolerance of anthropogenic influences, its segetal potential, and the role in developing the man-made biotopes and in evolution of the plant cover have been determined. The biological contamination by alien species of protected areas has been estimated as 9–14%.

The changes in the species composition over 150 years, indexes of modernization and the instability of the flora have been revealed, and the trends forming the stable and unstable elements of the alien flora of Ukraine has been shown. The peculiarities of the distribution of archaeophytes and kenophytes of the regional and urban floras as latitudinal gradients have been revealed. The analysis of plant invasions and expansions of 30 species has been reconstructed and reviewed. A group of highly invasive potential species is selected, and it consists of transformer-species. Some important characteristics of alien species, such as their activity in plant communities and its ecological effects, the trends of distribution and abundance, the participation and role under the influence of anthropogenic environmental change or climate change in various types of biotopes and geographical zones etc., have been analyzed.

Key words: alien flora, overview, Ukraine

BALCONIES, TRAMWAY TRACKS AND STONECROPS – NOTABLE PATHWAYS OF ESCAPE FROM GARDENING OF MEMBERS OF *SEDUM* AND RELATED GENERA IN BULGARIA

Boris Assyov[1], *Antoaneta Petrova*[2], *Rosen Vassilev*[3], *Kamen Bakardzhiev*[3]

[1] Department of Plant and Fungal Diversity and Resources, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Str., 1113 Sofia, Bulgaria
[2] Botanical Garden, Bulgarian Academy of Sciences, P.O. Box 664, 1000 Sofia, Bulgaria; petrovabotgar1@ abv.bg
[3] Bulgarian Biodiversity Foundation, 39-41 Vestletz Str., 1202 Sofia, Bulgaria

In this contribution we report five taxa of *Sedum* s. l. as garden escapes in Bulgaria, namely *Sedum pallidum* var. *bithynicum, S. sexangulare, Petrosedum montanum, P. thartii* and *Phedimus spurius.* In addition the findings of *S. sarmentosum* are significantly expanded. Flower containers on balconies of higher buildings are identified as common sources of seeds, which are easily spread by air and may give rise to new colonies, further established by seed reproduction and vegetative growth. Tramways tracks apparently provide favourable habitat at least for some species, notably for *P. thartii,* robust and fast growing species of this genus. The presence of pavements, tarmac and cement alleys in urban environment also seem to provide excellent conditions for establishment of several species and central heating likely has positive implications for the persistence of some less hardy sedums as *S. sarmentosum. Sedum pallidum* var. *bithynicum, S. sexangulare, P. montanum, P. thartii* and *Ph. spurius* seem to adapt well also to grass mowing, which visibly promotes vegetative growth of the plants. The establishment of *S. sarmentosum* is likely facilitated when previously developed moss cushions are present and this may well be true for other species of *Sedum* s. l.

Key words: alien plants, naturalized ornamental plants, *Petrosedum*, *Phedimus*, *Sedum*

DO WIND FARMS FAVOUR THE SPREAD OF INVASIVE ALIEN PLANTS IN PROTECTED AREAS? CASE STUDY: ROSCI0206 PORTILE DE FIER & ROSCI0060 DEALURILE AGIGHIOLULUI

Mihaela Urziceanu[1,2], *Tatiana Eugenia Șesan*[1,3], *Paulina Anastasiu*[1,2]

[1]University of Bucharest, Faculty of Biology; mihaela.urziceanu@yahoo.com
[2]University of Bucharest, Botanic Garden „D. Brandza"
[3]Academy of Agricultural Sciences and Forestry, Bucharest

Invasion of alien plants is a subject less approached connected with wind farms effect on plant biodiversity. Most studies aim at the direct impact on rare plants and habitats, and alien plants are overlooked, with few measures to prevent and control their spread, particularly over natural protected areas.

We studied since 2014 two wind farms from natural protected areas of Romania: "Sfânta Elena" in *ROSCI0206 Porţile de Fier*, and "Agighiol" in *ROSCI0060 Dealurile Agighiolului*.

The inventory performed contains 32 alien plants within the perimeter of wind turbines. We have noted 12 species with the status of invasive according to the list *Neophytes in Romania* (Anastasiu & Negrean 2009), among them 5 species (*Ailanthus altissima*, *Erigeron canadensis*, *Sorghum halepense*, *Veronica persica*, *Xanthium orientale* subsp. *italicum*) are frequently observed in both wind farms.

Some invasive species are expanding over the wind turbines platforms and along the turbine access roads, like *Ailanthus altissima* observed in both wind farms and *Ambrosia artemisiifolia* and *Erigeron annuus*, identified only in "Sfânta Elena" wind farm.

While some plants have a large expansion capacity, others have stagnated or were no longer found. Thus, in "Sfânta Elena" wind farm, the species *Dysphania schraderiana* and *Xanthium strumarium* were frequent in the area of turbines in the first years, but not found since 2016.

In"Agighiol" wind farm, alien plants are more limited around wind turbines, but over the years we have noted occurrence and slight spread of new species: *Alcea rosea*, *Euphorbia taurinensis*, *Trigonella caerulea*, *Sorghum halepense*.

Most of the alien plants in wind farms are favored by wind farm roads and wind turbines platforms. But, this aspect is corellated also with habitats affected by negative anthropogenic factors present in the area (grazing, plantations with alien species, practicing agriculture, abandoned land, etc).

Key words: alien plants, wind farms, protected areas, invasive species

RIPARIAN INVASION CORRIDORS OF BARNYARD GRASS IN SERBIA

Ana Anđelković [1], *Milica Živković* [2], *Dušanka Cvijanović* [2], *Dragana Marisavljević* [1], *Snežana Radulović* [2], *Danijela Pavlović* [1]

[1]Institute for Plant Protection and Environment, Department of Weed Research, Teodora Drajzera 9, 11040 Belgrade, Serbia; ana.andjelkovic21@gmail.com

[2]University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Trg Dositeja Obradovića 2, 21000 Novi Sad, Serbia

Barnyard grass, *Echinochloa crus-galli* (L.) P.Beauv. 1812, is a grass species native to the regions of tropical Asia. It is considered to be one of the worst weed species in both tropical and temperate regions. It has become invasive in various habitat types across the world, and in Serbia it has been classified as a highly invasive species. Consequently, our aim was to determine the importance of riparian corridors in Serbia for the further invasion of this invasive alien species (IAS) in our country. Field studies were performed over the summer months of four consecutive years (2013-2016), along the course of 36 rivers. Fieldwork was performed in 228 field sites, along 100 m long transects, where the presence and abundance of IAS were recorded. During this four-year research period the presence of *E. crus-galli* was recorded along the course of 27 rivers (75%). Of the total number of field sites, the presence of barnyard grass was documented at 110 field sites (48.25%). The analysis of the studied river stretches has shown that this species was present predominately along the rivers belonging to the catchment areas of the Sava (69.23% of field sites), Danube (51.11%) and Zapadna Morava (64%) rivers. The Drina catchment area also stood out, where the presence of *E. crus-galli* was recorded along the course of all of the analyzed rivers. Regional analysis shows that the wider area of the Belgrade city and southern and south-eastern Serbia have proven to be the regions with most rivers invaded by this IAS, with 100% and 88.89% of the rivers invaded, respectively. The obtained data on the distribution of *E. crus-galli* in riparian areas expand the current knowledge on its presence in arable and ruderal areas in our country, simultaneously highlighting river riparian areas as potentially important corridors of its spread.

Key words: *Echinochloa crus-galli*, barnyard grass, invasion corridors, rivers, Serbia

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POPULATION DYNAMICS OF *ORIENTUS ISHIDAE* AND *ACANALONIA CONICA* IN BUCHAREST – BANEASA AREA IN 2017, AFTER ONE YEAR FROM THEIR FIRST DETECTION

Constantina Chireceanu[1], *Diana Ioana Petcu*[2], *Andrei Teodoru*[1], *Andrei Chiriloaie-Palade*[1]

[1]Research and Development Institute for Plant Protection Bucharest, Ion Ionescu de la Brad 8, 013813 Bucharest, Romania; cchireceanu@yahoo.com
[2] University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

Orientus ishidae and *Acanalonia conica* are two of the latest invasive species we detected in Bucharest – Baneasa area, representing the first record for the territory of Romania in 2016. The insects were trapped on yellow sticky traps placed on various species of fruit trees, 63 individuals of *O. ishidae* and 21 individuals of *A. conica*. Seedlings of ornamental plants brought in the city were most probably the penetration pathway. The data collected in 2017 were compared with those resulting from previous year. The number of individuals caught on yellow sticky traps and from direct observations as well as the area covered increased in 2017, suggesting the two leafhoppers are in expansion. In 2017, in the period from June to mid-October, the total number of *O. ishidae* was more 10 times than in 2016, and the catches of *A. conica* were of 1.5 times higher than in previous year. The results obtained in this study can provide valuable information regarding the pests further spreading and the increasing trend of their population in different places in this area in the near future.

Key words: invasive species, green coneheaded planthopper, mosaic leafhopper

RANGE EXPANSION OF *METCALFA PRUINOSA* (HOMOPTERA: FULGOROIDEA) IN BULGARIA

Rumen Tomov[1], *Cvetelina Vasileva*[1]

[1]Department of Plant Protection, Faculty of Agriculture, University of Forestry, 10 Kliment Ohridski Blvd., 1797 Sofia, Bulgaria; rtomov@yahoo.com

After its introduction in Europe in the late 1970s the citrus flatid planthopper *Metcalfa pruinosa* (Say), a Nearctic species of Fulgoroidea has spread over most of Europe. This extremely polyphagous species was reported for the first time in 2004 on *Thuja oxidentalis* L. in small numbers in restricted urban area in Bulgaria. Feral populations of *M. pruinosa* were found in 2009 on *Acer campestre* L. and *Robinia pseudoacacia* L. in the northern part of the Black Sea coast. In 2010 the species was detected at the same localities. During the next several years, *M. pruinosa* spread over along the Black Sea cost of Bulgaria, reducing dramatically the ornamental value of urban vegetation.

During the period 2016-2018, more than 50 sites covered by semi-natural vegetation and ornamental plants were surveyed in urban areas and their surroundings in Bulgaria to assess the presence of *M. pruinosa* and its parasitoid *Neodryinus typhlocybae* (Ashmead). The pest was detected in the regions of Sandanski, Petrich, Sofia, Dobrich, Dolni Dubnik, Troyan, and Pleven, as well as along the Black Sea coast. Heavy infestations were observed only in urban areas along the Black Sea coast and the town of Pleven. *Neodryinus typhlocybae* was detected in North East Bulgaria. Our results suggest that *M. pruinosa* is still in the expansion phase of its invasion process in Bulgaria. The pathways of introduction of this species in Bulgaria are discussed.

Key words: Alien species, Insecta, parasitoid, distribution, host

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INVESTIGATION OF *SINANODONTA WOODIANA* (LEA,1834) (BIVALVIA, UNIONIDAE) ON THE TERRITORY OF THE REPUBLIC OF MOLDOVA

Oxana Munjiu[1], *Ion Toderaș*[1], *Igori Șubernetkii*[1]

[1]Institute of Zoology, Academy of Sciences of Moldova, Academiei st.1, MD 2028, Chișinău, Republic of Moldova; oksana.munjiu@gmail.com

In the Republic of Moldova, first two empty shells (length 10.4 and 14.3 cm) of *S. woodiana* were recorded in Lake Manta in 2003. The first living individuals of *S. woodiana* were recorded in the Lake Beleu in 2008. Both lakes are part of the Prut River basin which is the last largest left tributary of the Danube River.

During 2008-2017 more than 200 live specimens of *S. woodiana* were collected from the 6 sampling points of the Prut River basin: Leova, Gotești, Cahul, Lake Manta, Lake Beleu, Cîșlița-Prut.

The highest density was 40 ind./m^2, the highest biomass - 750 g/m^2. The largest specimen was 240 mm length; the smallest one was 36 mm, the smallest mature specimen (with glochidia larvae in gills) had a length – 55 mm and biomass – 18 g. This indicates a high rate of growth and maturation of *S. woodiana* in the Prut River basin. That is comparable with rate of growth in native region.

We observed a high ability of the *S. woodiana* to regenerate its damaged shell. For the survival, this species can recover the shell and increase their shell weight with approximately 50%, a pattern which is not found in the native species of bivalves. The one speciment of *S. woodiana* had survived under laboratory conditions with completely damaged ligament for a period of two months, this being kept before in the fridge and absence of water during two days.

S. woodiana continues to increase its areal upstream of the Prut River. The rate of spread of this invasive species on the territory of Republic of Moldova is about 15 km per year.

Biological particularities of this species such as the growth rate, biomass and wide ecological tolerance provide some advantages compared with native *Unionidae*.

Key words: *Sinanodonta woodiana*, Moldova, distribution, abundance, biomass

DISTURBED ECOLOGICAL STATUS MAY FACILITATE THE INTRODUCTION OF INVASIVE ALIEN SPECIES IN LAKE OHRID WATERSHED

Sasho Trajanovski[1], *Konstantin Zdraveski*[2], *Sonja Trajanovska*[1], *Biljana Budzakoska Gjoreska*[1], *Teodora Trichkova*[3]

[1] PSI Hydrobiological Institute Ohrid, 50 Naum Ohridski Street, 6000 Ohrid, Republic of Macedonia; trajsa@hio.edu.mk
[2]Association for Ecology ECOMENLOG Ohrid, ASNOM zg.3/1/3, 6000 Ohrid, Republic of Macedonia
[3] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

Invasive alien species (IAS) are considered as one of the main threats to the stability of the ecosystem of the ancient Lake Ohrid. The recent studies on IAS raised the awareness among the scientific community for deeper profiling of the project activities in a direction of targeted monitoring and creation of priority lists of alien species in the watershed of Lake Ohrid. The aim of our study was to monitor Lake Ohrid, its tributaries and outflow for the occurrence of alien species and to study the potential sources and vectors for their introduction.

The study was conducted subsequently in the period 2016 (in the tributaries of Lake Ohrid and the Black Drin River) and 2017 (in the littoral of Lake Ohrid). Samples of benthic diatoms, macrophyte vegetation, benthic macroinvertebrates, and fish were collected according to standard methods. In addition, the ecological status of water was monitored through the structure of the benthic diatoms, macrophytes and benthic macroinvertebrates.

Our results showed the presence of two alien fish species, one alien macrophyte species and one alien gastropod species at the studied localities. Unlike tributaries,

which are more prone to the introduction of IAS and are considered open systems and vectors for introduction of alien species, the localities in the lake, and the lake itself due to the specific conditions and stability of the ecological niches that are fully occupied by endemic and relict elements, create natural resistance and impede the easy adaptation of alien species. A positive correlation was established between the level of disturbed ecological status of the water and the presence of alien species, especially in the tributaries and the Black Drin River. The results also indicated the existence of a tendency of aggregation of alien species, i.e. the appearance of secondary and tertiary introduction by other alien species in the localities with disturbed ecological status. Given that the quality of the water as a medium is essential for the stability of communities in freshwater ecosystems, and that there was a correlation between the level of disturbed water quality and the presence of alien species, the disturbed ecological status could be considered as a factor that could facilitate the colonisation of Lake Ohrid watershed by invasive alien species.

Key words: Lake Ohrid, ecological status, alien species, introduction, vectors

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MOLECULAR IDENTIFICATION OF THE RED-BELLIED PIRANHA (*PYGOCENTRUS NATTERERI* KNER, 1858) CAGED IN DOJRAN LAKE

Lidija Velkova-Jordanoska[1]

[1] SI Hydrobiological Institute - Ohrid, Department of molecular biology, Naum Ohridski Str., No.50, Ohrid, Republic of Macedonia; lidvejo@yahoo.com

During summer period 2016 in Lake Dojran (R. Macedonia) was registered presence of red-bellied piranha (*Pygocentrus nattereri* Kner, 1858), non-native fish species not only for water ecosystems in Macedonia , but also for Europe as well. This paper records the first efforts to introduce molecular markers to determination of this introduced species. Molecular-biological analyses give as specific set of fragments characteristic for this species.

Key words: piranha, molecular identification, molecular markers

THE BULLHEADS OF GENUS *AMEIURUS* (ACTINOPTERYGII: AMEIURIDAE) IN UKRAINE

Iuliia Kutsokon[1], *Yuriy Kvach*[2,3]

[1]Schmalhausen Institute of Zoology of NAS of Ukraine, Vul. B. Khmelnytskoho 15, 01030 Kyiv, Ukraine; carassius1@ukr.net
[2]Institute of Marine Biology of NAS of Ukraine, Odesa, Ukraine
[3]Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Brno, Czech Republic

Two ictalurid catfish species, the brown bullhead, *Ameiurus nebulosus* (Le Sueur, 1819) and the black bullhead, *Ameiurus melas* (Rafinesque, 1820) were found in Ukraine. They originated from North America and were introduced to Europe. Since 1937, the brown bullhead has invaded the Shatsk Lakes, Vistula River drainage and, since 1954, the waterbodies of the Danube basin in Transcarpathia (Movchan 1988). Recently, the brown bullhead was reported from the Prypyat basin in northern Ukraine, near the Ukraine-Belarus border, also near the city of Rivne (Bigun & Afanasyev 2011). In all reported sites in Ukraine, the brown bullhead has become rather common, forming stable local populations. In the Transcarpathian Ukraine, the species spread very fast, invading almost all water bodies of the Pannonian steppes (Latorica, Uzh, Borzhava, Tisza basins, mainly floodplains lakes, channels, reservoirs, ponds) during 8 years since first finding (Movchan 1988). During the recent decade several new findings of the brown bullhead were reported for the Transcarpathian and Northern Ukraine, and it was found in the Dniester River basin last year, 2017, city of Lviv. The black bullhead, *Ameiurus melas*, was reported first in 2004 in Ukraine, only from the Tisza River, Transcarpathia (Koščo et al. 2004). Now, the black bullhead spreads very quickly in Transcarpathia (Latorica, Uzh, Borzhava, Tisza basins, mainly floodplains lakes, channels, reservoirs, ponds) in the same way that brown bullhead earlier and is considered as invasive species in Ukraine (own data, Movchan et al. 2014). In the case of further finding of bullheads in Ukraine their status could be considered as invasive.

Key words: invasive fauna, Ameiuridae, Ukraine

CARASSIUS GIBELIO (BLOCH, 1782): COMPARATIVE ECOLOGICAL OVERVIEW OF PARASITIC FAUNA IN THE JANDARI AND MADATAPA LAKES

Lali Murvanidze[1], *Tsitsino Lomidze*[1], *Ketevan Nikolaishvili*[1], *Lela Arabuli*[1], *Ketevan Asatiani*[1], *Keto Davitaia*[1]

[1]Ilia State University, Institute of Zoology, K.Cholokashvili 3/5, Tbilisi 0162, Georgia; lali.murvanidze@iliauni.edu.ge

Parasitic fauna of *Carassius gibelio* (Bloch, 1782) from two reservoirs located in Southern part of Georgia and having different climatic conditions, origin and ichthyofauna is compared. Jandari Lake with about 20 species of fishes is located on Lower Kartli lowland (291m a.s.l.) which has semidesert, dry subtropical climate. Madatapa Lake is naturally, vulcanic in origin eutropic lake located on Javakheti plateau (2108 m a.s.l.) with severe continental climate. In 1990th the gibel carp was introduced there and it is the only fish species in Lake Madatapa.

The parasites of *C. gibelio* from Jandari Lake were collected in different seasons of 2014-17 years. 423 individuals were investigated. 20% of them were affected by 11 species of parasites: Protozoa *(Trichodina sp., Ichthyophthirius multifilis), Monogenea (Dactylogyrus vastator, Gyrodactylus elegans, Ancyrocephalus sp., Diplozoon paradoxum*), Trematoda (*Diplostomum spathaceum*), Nematoda (*Philometra sp., Contracaecum osculatum*), 1-Crustacea, 1-*Dermocystidium* sp. In Madatapa Lake, *C. gibelio* were sampled in September 2014. 34 young individuals of the fishes were also investigated and 91 % of them appeared to be infested with larvae of two, taxonomically different, but similar with the life cycle groups of helminths (*Ligula intestinalis*, *Diplostomum spathaceum*).

In parasitic fauna of *C. gibelio* of Jandari Lake prevail monoxenous, mature species (5), however, overall rate of infestation is low. Parasitofauna of *C. gibelio* of Madatapa Lake is presented by only two species. Both parasites have same trixenous type life cycle and are extremely pathogenic for host fish, percentage of infestation is high.

We consider that prevalence of monoxenous species in Jandara Lake as a result of climate change and anthropogenic pressure which resulted in quantitative and qualitative decline of fish feeding birds in this region. Parasitic fauna of *C. gibelio* in Madatapa Lake is determined by abundance of components necessary for life cycle of *L. intestinalis* and *D. spathaceum* (high number of migrating and local, fish-feeding birds around the lake; abundant zooplankton and mollusks).

The parasitocenosis of the gibel carp of Jandari and Madatapa lakes is the classical example of the formation of parasitic fauna of the host organism under the influence of environmental factors.

Key words: *Carassius gibelio*, parasitofauna, ecological overview

DISTRIBUTION AND PATHWAYS OF INTRODUCTION AND SPREAD OF *PSEUDORASBORA PARVA* (TEMMINCK & SCHLEGEL, 1846) (CYPRINIDAE) IN BULGARIA

Tihomir Stefanov[1], *Milcho Todorov*[2], *Kostadin Ignatov*[3], *Ivan Botev*[2], *Teodora Trichkova*[2]

[1] National Museum of Natural History – Sofia, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; tishos@gmail.com
[2] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; trichkova@gmail.com
[3] Biological Faculty, Sofia University, 8 Dragan Tsankov Blvd., 1164 Sofia, Bulgaria

The topmouth gudgeon *Pseudorasbora parva* has been considered as an invasive alien species of European Union concern according to the Regulation (EU) No 1143/2014 and a priority species for the ESENIAS region. The first records of *P. parva* in Bulgaria were reported in 1975 from the Mechka fish ponds located along the Danube River and from the Danube River near Krivina and marshes between Tutrakan and Silistra. It is assumed that the species was introduced with stocking material of Asian carp fish originated from the former Soviet Union. Few years later the topmouth gudgeon was found in the regions of Lom, Sofia and Plovdiv and gradually colonised different water bodies all over Bulgaria. Our aim was to study the current distribution and pathways of introduction and spread of *P. parva* in Bulgaria. The study was based on data from field surveys and available published data.

Pseudorasbora parva was found in the Bulgarian sector of the Danube River and in the inland river systems within the three river drainage basins in Bulgaria: the Danube River basin (almost all Danube tributaries and many standing water bodies), the Black Sea basin (rivers Kamchiya, Hadzhiiska, Sredetska, Ropotamo, etc.), and the Aegean Sea basin (river basins of Maritsa, Mesta, Struma, and others). Our results showed that the species continued to extend its range in Bulgaria. The following main pathways of introduction of *P. parva* to new water bodies were identified: transport as contaminant of stocking material, mainly of herbivorous fish as *Hypophthalmichthys molitrix, H. nobilis* and *Ctenopharyngodon idella*; use as fish bait by anglers; through the canal systems (irrigantion, drainage and flood control); and through natural dispersal from the Danube River and the inland river basins. Possible measures for prevention and control of new introductions of *P. parva* are discussed.

Key words: Topmouth gudgeon, invasive alien species of EU concern, occurrence, pathways of introduction and spread, Bulgarian inland water bodies

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THE EVOLUTION AND SPREAD OF INVASIVE FISH SPECIES IN VACARESTI NATURAL PARK

Adrian Ionaşcu[1], *Nicolae Crăciun*[1, 2]

[1]Ecological Society for the Study and Protection of Wild Flora and Fauna AQUATERRA, Splaiul Independentei 91-95, Sector 5, Bucharest 050095, Romania
[2]Faculty of Biology, University of Bucharest, Splaiul Independentei 91-95 sector 5, Bucharest 050095, Romania; nicolae.craciun@yahoo.com

The Văcărești "delta" area is characterized as a bottom of a stunted lake, left behind after the unfinished work on the transformation of this natural wetland in a dam lake. Văcărești wetland, which is part of the Dambovița meadow, has always been an area of high natural biodiversity. Unfortunately, the landscaping works carried out in the late 1980s have destroyed much of this natural diversity. Since the construction stopped, the area began to recover naturally and this process continues after 30 years. The series of small ponds from the concrete tub shelter a strange mixture of native and invasive fish species that have survived or were brought by humans or natural conditions. The fish population is rich, heterogeneous, constantly evolving, represented by a strange mixture of indigenous species (pike, Crucian carp, perch, roach, rudd) and alien species (Prussian carp, brown bullhead, Mosquito fish, common sunfish). From time to time there are also exotic species, released by aquarists, which survive only until the coming of winter. This ecosystem has been heavily influenced by the impact and anthropogenic influence so that it is presently in an „exotic" structure with a mosaic of native species that survived the human intrusion or naturally recolonized the area that coexists with various allogenous species introduced directly or accidentally by humans.

Key words: invasive species, urban park, biodiversity, ecological reconstruction

TOPIC 3: THE DANUBE RIVER AS INVASIVE ALIEN SPECIES CORRIDOR

Priority species for the Danube Region, impact on threatened species, specificity of biological invasions in Lower, Middle and Upper Danube River sections

ALIEN PLANT SPECIES IN THE NATURAL PARK IRON GATES (ROMANIA)

Paulina Anastasiu[1], *Gavril Negrean*[1]

[1]University of Bucharest, Faculty of Biology & Botanic Garden "D. Brandza", Intr. Portocalelor 1-3, 060101-Bucharest, Romania; paulina.anastasiu@bio.unibuc.ro

Natural Park "Porţile de Fier" (Iron Gates) was established in 2000 and is the longest protected area in Romania with a length of about 130 km. On its area there are 18 natural reserves sheltering rare fauna and flora, especially endemic plants like *Stipa danubialis*, *Tulipa hungarica*, *Campanula crassipes* and others.

Our research was conducted along the Danube River, from Schela Cladova to Baziaş. We selected this area because here there are the most important places with endemic and rare plants and, in the same time, the anthropic pressure is very high. A special attention was payed to railway station and harbour from Orşova town, as possible hot spot for alien invasive plant species.

Based on field research and bibliography, for the studied area we compiled a list with over 200 alien plant species, neophytes, as well as archaeophytes or species with uncertain native distribution.

Among the most abundant and expansive alien plant species, we note *Ailanthus altissima* and *Ambrosia artemisiifolia*. *Ailanthus altissima* was recorded especially on the steep slopes and its expansion was favoured by wrong management practices used in the past in order to forestry some area in Danube Gorge. *Ambrosia artemisiifolia* is very widespread, especially along the roads, but it could be found in pastures as well. *Paspalum paspalodes* realizes extensive monodominant pastures on the Moldova Nouă Islet and on the area where Nera River flows into the Danube (Baziaş).

A new alien species for this area was recorded in 2018: *Lindernia dubia*. This has so far been reported only in the Danube Delta.

Knowledge of alien species in the Natural Park "Porţile de Fier", distribution and amplitude of the invasion process in this protected area is a condition to find the most effective management measures for these plants in order to minimize their effects.

Key words: alien plant, invasive, neophytes, Danube River

NEW RECORDS OF INVASIVE ALIEN AND TRANSLOCATED FISH SPECIES IN THE DANUBE RIVER AND ADJACENT WATER BODIES IN BULGARIA AND ROMANIA

Teodora Trichkova[1], Milcho Todorov[1], Ivan Botev[1], Dan Cogălniceanu[2], Doru Bănăduc[3], Tihomir Stefanov[4], Luchezar Pehlivanov[1], Yuriy Kvach[5,6], Pavel Jurajda[6]

[1] Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria; trichkova@gmail.com
[2] Faculty of Natural and Agricultural Sciences, Ovidius University of Constanţa, Constanţa, Romania
[3] Faculty of Sciences, 'Lucian Blaga' University of Sibiu, Sibiu, Romania
[4] National Museum of Natural History – Sofia, Bulgarian Academy of Sciences, Sofia, Bulgaria
[5] Institute of Marine Biology of National Academy of Sciences of Ukraine, Odessa, Ukraine
[6] Institute of Vertebrate Biology of the Czech Academy of Sciences, Brno, Czech Republic

As part of the Southern Invasion Corridor the Danube River has been exposed to the introduction and influence of invasive alien fish species. About 30 alien fish species have been reported from the Danube River, of which 10 species are included in the 'Danube Black List' by the International Commission for the Protection of the Danube River, and 14 species are considered as priority for the ESENIAS region. Here we report new records of the invasive alien species *Ameiurus melas* and *Perccottus glenii*, and translocated *Syngnathus abaster* in the Danube River and adjacent standing water bodies in Bulgaria and Romania. The study was conducted during the period 2012–2017.

The first record of *A. melas* in the Romanian sector of the Danube River was from Drobeta Turnu Severin in 2005. In Bulgaria, the species was first reported from Srebarna Lake in 2013 and from the discharge canal of Malak Preslavets Lake in 2014. During our study, abundant populations of this species were found in five reservoirs in northwest Bulgaria in 2016. These are the first records from standing water bodies in Bulgaria.

Perccottus glenii was first recorded in the Bulgarian-Romanian river section in 2005 – in Drobeta Turnu Severin (Romania) and from Vrav to Lom (Bulgaria). The species was also reported from lakes Srebarna and Malak Preslavets. We found it in new localities along the Danube River, as well as in canal systems and former fish ponds near Vidin, Orsoya, and Kalimok-Brushlen Protected Area in Bulgaria, and in wetlands near Ostrov in Romania.

The first data about the occurrence of *S. abaster* in the Bulgarian Danube River section was from Silistra in 1982. During 2005–2006, the species was reported as frequent and abundant along the entire Bulgarian section. We found this species in several new localities in the Danube River and in one reservoir in northwest Bulgaria, which is the first record of a standing water body for Bulgaria.

Key words: Alien fish species, *Ameiurus melas*, *Perccottus glenii*, *Syngnathus abaster*, distribution, the Lower Danube River basin

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OBSERVATIONS ON THE EXPANSION OF THE INVASIVE FISH *PERCCOTTUS GLENII* IN ROMANIA

Nicolae Crăciun[1, 2], *Adrian Ionaşcu*[1]

[1]Ecological Society for the Study and Protection of Wild Flora and Fauna AQUATERRA, Splaiul Independentei 91-95, Sector 5, Bucharest 050095, Romania
[2]Faculty of Biology, University of Bucharest, Splaiul Independentei 91-95 sector 5, Bucharest 050095, Romania; nicolae.craciun@yahoo.com

Fish fauna assessment was carried out in a range of freshwater reophile habitats in the Danube River and tributaries from Romania. The invasive fish species *Perccottus glenii* was found thriving mainly in shallow water ponds with high organic loads, and dense aquatic vegetation. It was also found in small, fast flowing creeks and large rivers (Danube tributaries), as well as large lakes with high fish diversity. These findings highlight the broad and fast expansion of *P. glenii* in flood ponds and canals in the Danube flood plains, particularly in the following areas from Romania: "Small Island of Braila", Desa-Ciuperceni and Siret River catchment area. In the zones where *P. glenii* was found it was well represented in the fish community, with all ages and sizes present. In most of these locations *P. glenii* is the dominant fish species based on the number of specimens. Comparing past and present field observations, this invasive species has continuously expanded being found in new locations and areas each year.

Key words: *Perccottus glenii*, invasive, expansion, loss of biodiversity

AGE-SIZE STRUCTURE OF A ROUND GOBY POPULATION IN THE DANUBE DELTA, AS A POSSIBLE SOURCE FOR THE INVASIVE ONE IN THE SOUTHERN CORRIDOR OF AQUATIC INVASIONS

Veniamin Zamorov[1], *Mariya Zamorova*[1], *Yuriy Kvach*[2,3]

[1]Odessa I.I. Mechnikov National University, Department of Hydrobiology and General Ecology, Odessa, Ukraine; v.zamorov@onu.edu.ua
[2]Institute of Marine Biology of NAS of Ukraine, Odessa, Ukraine; yuriy.kvach@gmail.com
[3]Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Brno, Czech Republic

The round goby, *Neogobius melanostomus* (Pallas, 2014) (Actinopterygii: Gobiidae) is considered as an invasive species alone the Danube-Rhine corridor (Roche et al. 2013). In the Danube, the native range of this species is limited by the Iron Gate dam. The Lower-Danube population is a source for the invasive one in the Upper Danube, and partly in the River Rhine (Janáč et al. 2017). The knowledge of life history trait of source populations is important to understand the invasion triggers. Therefore, we studied the round goby population in the Ukrainian Danube delta, as a possible source for the invasive one in the Upper Danube. The fish were caught in different seasons of 2004–2007 and 2015–2016 in Lake Yalpuh, Ukraine. In total, 1900 individuals were sexed, then the standard length and total weight were measured. Otoliths were isolated to determine age. During a year 2+ group was prevailed. At spring-summer, it was joined by 3-years old group, but at autumn by 1+. Males prevailed almost in all samples (58–100%). Only exception, when 1+ females prevailed (62.2%), was autumn 2007. The 4+ group was represented by males only. The maximal size and weight (18.5 cm; 180 g) were observed in a 3+ male in October 2004. The females were usually smaller than same-age males. The 2-3-years old males were significantly grown in size and weight from summer to autumn 2004, 2005 and 2015. During April-August 2006, 2-2+ and 3-3+ males were not grown in size and weight. At the end of summer, 2+ females had lower sizes then at spring. Probably, it was caused by spawning migration of larger individual to shallow waters.

Key words: Ponto-Caspian gobies, Southern Corridor of Aquatic Invasions, source population

TOPIC 4: INVASIVE ALIEN SPECIES IMPACT

Environmental impact, impact on ecosystem services, socioeconomic impact and impact on human health; pestsand pathogen

LITTER DECOMPOSITION OF EXOTIC JAPANESE KNOTWEED (*FALLOPIA JAPONICA*) AND COMMON ALDER (*ALNUS GLUTINOSA*) IN RELATION WITH LONGITUDINAL AND TRANSVERSAL STREAM CONECTIVITY

Geta Rîșnoveanu[1], *Cristina Popescu*[1], *Darmina Niță*[1], *Valentin Dinu*[1], *Marius Bujor*[1], *Corina Bradu*[1], *Constantin Cazacu*[1]

[1]University of Bucharest, Department of Systems Ecology and Sustainability, Spl. Independentei 91-95, 050095, Bucharest, Romania: geta.risnoveanu@g.unibuc.ro

Japanese knotweed (*Fallopia japonica*) is frequently reported in literature as an invasive shrub that spreads along riparian corridors establishing monospecific stands which replace native riparian vegetation. Leaf litter produced in the riparian zones represents the basis for aquatic food webs in low order streams. Changes in the structure and composition of riparian plant communities alter the allochthonous material input into the adjacent streams (i.e. timing, quantity, secondary compounds in leaf litter, its palatability to detritivores). Benthic macroinvertebrates and key ecological processes of streams such as nutrient cycling, nutrient availability and organic matter production are affected. The knowledge related to these interactions remains limited, contrasting results being reported so far.

This paper reports the results obtained in a field experiment conducted in the Arges River basin (Romania) where we noticed the presence of Japanese knotweed. Leaf litter bags of two mesh sizes (0.5 and 10 mm) were deployed in 30 sites located along low order streams: six forested sites, 10 pair sites with the upstream site without and the downstream site with woody riparian strips, and four impacted sites, with no woody buffers, place downstream to account for the cumulative impacts. The aim was to assess the impact of the invasive riparian species, *F. japonica*, on a key ecosystem function (litter decomposition) of streams. The rates of leaf litter decomposition for the invasive Japanese knotweed and the native alder (*Alnus glutinosa*) as well as the macroinvertebrates species composition, abundance and diversity within exotic and native leaf packs are discussed. The exotic litter decomposed significantly slower than the native litter. Decomposition rates for both types of litter increased with decreasing of stream-riparian connectivity. These patterns prove consistent across all sites categories.

This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CCCDI–UEFISCDI, project number BiodivERsA3-2015-49-CROSSLINK.

Key words: ecosystem functioning, carbon cycle, resilience, stream connectivity, riparian woody buffer strips

AILANTHUS ALTISSIMA (MILL.) SWINGLE IMPACT ON BIODIVERSITY – PRELIMINARY DATA

Daniyar Memedemin[1], *Cristina Preda*[1], *Marius Skolka*[1]

[1]"Ovidius" University of Constanța, Department of Natural Sciences, Universitatii Alley no. 1, 900470, Constanța, Romania; daniyar_memedemin@yahoo.com

The tree of heaven, *Ailanthus altissima* (Mill.) Swingle, a fast growing deciduous tree native to northern and central China, is one of the species included on DIASIE's 100 worst invasive species (www.europe-aliens.org). Species with a high ecological plasticity, *A. altissima* can cause major imbalances in a wide range of habitats. Assessing the impact on biodiversity is challenging but necessary to unravel the role of this species in native communities and functioning of the invaded ecosystems. Our ongoing study aims to assess the impact of *A. altissima* on biodiversity in Dobrogea, using plants and invertebrates as potential indicators of this impact. We perform our investigations in two study areas located on a latitudinal gradient, namely Macin Mountains National Park and Canaraua Fetii Natural Reserve, in habitats with and without *A. altissima*. Preliminary results reveal that habitats where *A. altissima* is present have a lower diversity of plant species and ground-dwelling invertebrates. Such changes are of particular importance in protected areas where control/eradication measures should be implemented. Our results may contribute to the development of coherent strategies for the management of this species.

Key words: alien species, invasive, tree of heaven, impact, protected areas, Dobrogea

THE STATUS AND IMPACT OF THE BROWN MARMORATED STINK BUG, *HALYOMORPHA HALYS* STÅL (HETEROPTERA:PENTATOMIDAE) IN ROMANIA

Traian Manole[1], *Laura Ioana Macavei*[2], *Petronela Camen-Comănescu*[3]

[1]Research-Development Institute for Plant Protection, Bucharest, Romania, 8, Ion Ionescu de la Brad, 013813, Bucharest, Romania; e-mail:traian.manole@gmail.com
[2]Università degli Studi di Modena e Reggio Emilia, Modena, Italy
[3]University of Bucharest, Botanic Garden "D. Brandza", Bucharest, Romania

Halyomorpha halys became, after the 3 years of his invasion in Romania one of the most dangerous invasive pest species not only for agricultural field but for entire environmental landscape from Romania, natural, seminatural or cultivated. Reviewing the previous scientific literature and after 2 years of field investigations in some dis-

trict from country the paper had to bring new contributions regarding the distribution of species, and the number of host plants and impact on the main host plants.

Key words: *Halyomorpha halys*, monitoring, distribution, host plants

FACULTATIVE BLOOD-SUCKING LACE BUGS, *CORYTHUCHA SP.*, IN ROMANIA

Roxana Ciceoi[1]

[1] Laboratory of Diagnose for Plant Protection, Research Centre for Study of Food and Agricultural Products Quality, University of Agronomic Sciences and Veterinary Medicine, Bd. Mărăști 59, 011464, Bucharest, Romania; roxana.ciceoi@gmail.com

The earliest mentions of biting caused by lace bugs, *Corythucha* sp. date back to the 50s, in the United States of America. The first cases of biting in Europe have been mentioned in northern Italy since 2010 and the confirmation of the hematophagous behaviour of the lace bugs was done in 2015 in France by DNA barcoding. In Romania *C. ciliata* was first reported in 1990 in Craiova and then in 2011 in Sibiu, while *C. arcuata* was spotted for the first time in 2015 in Arad. In 2017 and 2018, in many cities across the country, but especially in Bucharest, many citizens, especially children, arrived at the hospital with allergic reactions such as bloating, itching and reddened skin. Preliminary results of a questionnaire showed that citizens were bitten especially at noon, 50% of those with symptoms having A2 blood group and 30% blood group *01*. The blood sucking behaviour seems to be triggered by the excessive heat. The DNA barcoding of few specimens found active in the winter 2017-2018, in the greenhouse lead to uncertain conclusion and need to be repeated.

Key words: *Corythucha ciliata*, *Corythucha arcuata*, citizen science, facultative hematophagous insects, DNA barcoding

THE POISONOUS MARINE ALIEN SPECIES IN TURKISH MARINE WATERS

İrfan Uysal[1]

[1]The Ministry of Agriculture & Forestry, General Directorate of Nature Conservation & National Parks, 06560 Beştepe, Ankara, Turkey; i.uysal@ormansu.gov.tr

Turkey is surrounded by 3 different marine ecosystems but at the same time high risk of entry of alien species. Because of the climate change, the Mediterranean seawater temperature as vertically and horizontally increased. Therefore the alien species coming from the Red Sea, Indian and Pacific Oceans are able to adapt and quick-

ly proliferate in the Eastern Mediterranean Sea. Currently, while over 1000 IAS are found in Mediterranean, over 450 IAS are found along the Turkish Mediterranean coast and 21 species in the Turkish Black Sea. This number continues to grow. 66% of the 450 species are coming via the Suez Canal to the Mediterranean Sea. About 80% of IAS coming via ballast water to the Black Sea. Most of marine alien species are poisonous such as: Lion fish (*Pterois miles*), Stone fish (*Synanceia verrucosa*), Elongated puffer (*Lagocephalus sceleratus*), Nomad jellyfish (*Rhopilema nomadica*), and Stinging hydroid (*Macrorhynchia philippina*). Poisonous marine alien species can pose significant threats to native species, habitats, fisheries, economy and human health especially during the high tourism seasons.

Key words: Alien species, Poisonous marine species, Turkish marine waters

TOPIC 5: INVASIVE ALIEN SPECIES PREVENTION AND MANAGEMENT

Early detection and rapid eradication, surveillance systems; risk assessment and horizon scanning; control measures; restoration of damaged ecosystems; education, citizen science, strategies, policy and legislation; IAS networks and information systems, databases, data planning and management

TOPIC 6: MANAGEMENT AND SHARING OF IAS DATA

IAS networks and information systems, databases, data planning and management

INTRODUCED SPECIES IN BULGARIA – MEASURES AGAINST THEM

Boryana Katinova[1], *Mariana Laginova*[1]

[1] Central Laboratory for Plant Quarantine, Bulgarian Food and Safety Agency, 120 Nikola Mushanov Blvd., 1330, Sofia, Bulgaria; b.katinova@abv.bg

Every year, the growth in the trade of plants and plant products in Europe is increasing, which favor the spread of different species of organisms in their habitats. The main ways of introducing non-native organisms in the European Union are by transporting whole plants, parts of plants, soil, wood packaging material from third countries. Once they are introduced in new territory some insects have the ability to quickly adapt to the changing living environment and to grow and propagate in a given area for a short period of time in a climate favorable to their development and even to settle permanently. Several species of insects have been introduced into the territory of Bulgaria for the last few years - *Metcalfa pruinosa* (Say), *Aceria kuko* (Kishida), *Drosophila suzukii* (Matsumura). Wet and warm summer contributes for their development and for a short time they develop and multiply in certain territories in the country.

Key words: adapt, climate, introduced

BIO-HERBICIDAL EFFECTS OF FIVE ESSENTIAL OILS ON SEED GERMINATION AND EARLY SEEDLING GROWTH OF VELVETLEAF (*ABUTILON THEOPHRASTI* MEDIK.)

Marija Saric-Krsmanovic[1], *Ahmet Uludag*[2], *Jelena Gajic Umiljendic*[1], *Ljiljana Radivojevic*[1], *Ljiljana Santric*[1], *Ivana Potocnik*[1], *Rada Djurovic-Pejcev*[1]

[1]Institute of pesticides and environmental protection, Banatska 31b, 11080 Belgrade, Serbia
[2] Faculty of Agriculture, Çanakkale Onsekiz Mart University, Turkey; marijasaric.msaric@gmail.com

The approach to the agriculture activity in the last years has changed. The great interests in sustainable and organic agriculture have lead research and studies on a different path from the past, more focused on ecology, environment and human health instead than basic production. Objective of this research was the evaluation of the inhibition effect exerted by the essential oils of basil, sage, thyme, lemon balm and goldenrod on seeds germination and early seedling growth (seedling and radical length) of velvetleaf (*Abutilon theophrasti* Medik.) weed.

The solutions of the essential oils obtained by hydrodestilation were prepared with 0.5 ml of each essential oil emulsified with Tween 20 in ratio of 1:1 (v v^{-1}) and

dissolved in distilled water to give a stock solution at a concentration of 1%. The other concentrations (0.1% and 0.01% v v^{-1}) were prepared by dilution.

In a laboratory bioassay, seed germination, seedling and radical length of velvetleaf decreased with increased concentration of essential oils from 0.01 to 1%. The obtained data revealed a highly significant effect ($p<0.05$) between control and 1% and 0.1% oil concentrations in all treatments for seed germination, seedling and radical length, while between control and 0.01% oil concentration there were no significant differences. The essential oils of basil, thyme and lemon balm exhibited more powerful bio-herbicidal effect compared to sage and goldenrod essential oils on the germination and early seedling growth of velvetleaf weed.

Key words: velvetleaf, essential oils, seedling and radical length

CONTROL MEASURES OF *XANTHIUM ITALICUM* - AN INVASIVE SPECIES IN MAIZE CROP IN ROMANIA

Marga Grădilă[1], *Daniel Jalobă*[1]

[1]Research Development Institute for Plant Protection Bucharest, Biological Assessment Laboratory, Bd. Ion Ionescu de la Brad 8, Sect.1, 013813, Bucharest, Romania; marga.gradila@icdpp.ro

Maize crop (*Zea mays* L.) has a major place in the agricultural economy of Romania, and is yearly infested by perennial and annual mono and dicotyledonous species very difficult to fight against, that compete strongly for water, carbon dioxide, light, air and nutrients. Lately in the last years, it has been found that the invasive species *Xanthium italicum* Moretti causes more and more damage to crops, the success of this plant being provided by some biological particularities which ensures it a broad expansion, although it is an annual plant. *X. italicum* is one of the most problematic weed in the world because of its seeds that are easy to spread over due to their ability to float and hang on humans and animals. It has a high enough height and fructifies abundantly, regardless of climatic conditions. Epizoohoria propagates it in unexpected places. It depreciates the sheep›s wool and is toxic to animals. This weed quickly becomes dominant in a crop, due to the prolific seed production and high rates of germination and survival. The researches carried out in southern part of Romania during 2016-2018 demonstrated that maize is greatly influenced by competition of *X. italicum* having an adverse impact on its phenology and growth, producing quantitative and qualitative losses of production. Related to this context, the paper presents data on invasive species management: X. i*talicum* by integrating agro technical measures with products for plants protection.

Key words: invasive species, maize, weeds, herbicides, agro technical measures, management

MONITORING THE SPREADING OF SOME INVASIVE INSECT SPECIES IN THE SOUTH-EAST ZONE OF ROMANIA

Traian Manole[1], *Constantina Chireceanu*[1], *Andrei Teodoru*[1], *Andrei Palade Chiriloaie*[1]

[1] Research-Development Institute for Plant Protection, 8, Ion Ionescu de la Brad, 013813, Bucharest, Romania; traian.manole@gmail.com

Located in the central-eastern area of Europe, Romania is at the crossroads of important European roads and, at the same time, on the main directions of the invasion of insect species that once entered in the country can have a consistent economic impact on native, local biodiversity. In the last decade, a series of species from different taxonomic families have entered by the Balkan way and are expected to penetrate others through various ways: roads, vegetal imports, tourism, etc. From the east, from the Asian area, a number of other species have also penetrated and would penetrated, some of which have produced real disasters in the invasion areas. Invasive species monitoring activity is a major component of the prevention system for invasive alien species included in the first objective of this system, namely that of rapid detection and control in order to prevent, as far as possible, the prevention of accidental intrusion of such invasive species. An effective prevention and monitoring system works, for example, in Italy, with which it has managed to stop the penetration of the invasive species *Diabrotica virgifera virgifera* LeConte in Italy.The paper presents a series of data on the situation of the monitoring of invasive species already on the Romanian territory, such as the spreading area, the species of attacked plants, the degree of attack on the frequently attacked hosts and the estimation of a possible economic impact. It also presents the current situation of the invasion of dangerous species on the territory of Europe and near the borders of Romania.

Key words: invazive species, distribution, host plants, attack degree

ECONOMIC ASPECTS OF THE INVASIVE ALIEN SPECIES – HOLISTIC MITIGATION MEASURES APPROACH

Konstantin Zdraveski[1], *Sasho Trajanovski*[2]

[1]Association for Ecology ECOMENLOG Ohrid, ASNOM zg.3/1/3, 6000 Ohrid, Republic of Macedonia; tincoz@yahoo.com

[2] PSI Hydrobiological Institute Ohrid, 50 Naum Ohridski Street, 6000 Ohrid, Republic of Macedonia; trajsa@hio.edu.mk

Invasive alien species have a great impact on the biodiversity, health and economic activity in the world. It can be very difficult to accurately assess the economic cost of invasive species, due to the complexity and interconnection of the spheres they affect. According to the Center of Invasive Alien Species and Ecosystem Health, the estimated damage from invasive species worldwide totals to more than 1.4 trillion dollars, which accounts for five percent of the worlds economy. What is more, the risk and impact of the IAS is expected only to grow in the future, which makes undertaking preventive measures inevitable and crucial for the sake of the biodiversity, human health, as well as for economic purposes. This is one of the reasons why the European Union has its own interest to act in combating the IAS including the outermost regions, as well as responsibilities in third countries. Prevention might be cost effective, as the case with an early detection and action. However, based on numerous researches the existing measures on IAS are not holistic and do not address the entire challenge. That is why there are needed new measures to address the gaps in the combat against IAS and the remaining challenges in this field. The study suggests ways in which the nations could enhance the mitigation of the IAS effects on the economy, as well as the biodiversity and human health. It is evident that these actions should be based on ordination and cooperation in order to ensure effective action and to maintain the costs for doing so at optimal levels. Hence, the EU level role is important to complement all national efforts which have been undertaken till now by different Member States.

Key words: invasive alien species, economic impact, risk, mitigation measures, cooperation, optimal cost

THE COMPERATIVE ANALYSIS OF ALIEN PLANT SPECIES OF THE UKRAINIAN INFORMATION SYSTEM: FAMILIES ASTERACEAE, POACEAE, BRASSICACEAE

Nataliia Pashkevych[1], *Liudmyla Lysohor*[1], *Liubov Gubar* [1]

[1]Institute for Evolutionary Ecology NAS Ukraine, Department of Population Dynamics, 37 Lebedeva str., 03143, Kyiv, Ukraine; lisogor.1981@gmail.com

The problem of alien species has been discussed at different international scientists on conferences and forums. Created Information system (Database) for environmental threats of alien species of plants Ukraine are a very helpful tool for addressing to finding answers to a few basic questions about the patterns of invasions of alien species and why some habitats are more invaded than others.

The Information Network on for today includes 781 alien plant species belonging to 410 genera and 89 families. The most numerous were species from the families Asteraceae (14.9%, 116 spp.), Brassicaceae (10.1%, 78 spp.) and Poaceae (9.2%, 71 spp.). The leading genus of this families is the genus – *Artemisia* L. (13 spp.), *Xanthium* L., *Sisymbrium* L. (each 13 spp.) and *Avena* L., *Hordeum* L., *Setaria* L. (each 6 spp.). The kenophyte list includes 205 species, the archaeophyte list comprises 60 species. Most numerous of the alien plants by families Asteraceae, Brassicaceae and Poaceae came from Mediterranean Basin (110 spp.), Asia (49 spp.), North America (46 spp.) and relatively few originated from Europe (11 spp.). Almost half (61.9%) of the alien species by researches families are therophytes. Hemicryptophytes (35.8%) is well represented and geophytes, chamaephytes (1.1%) are less frequent. The majority of the kenophytes (45.7%) are therophytes, 19.2% hemicryptophytes. In accordance to the degree of naturalization, the group of epekophytes covers 135 species (50.9 %). All alien species, including in Information system, occurs in human-made biotopes (I and J type by EUNIS) – abandoned lands, roadsides, railroads and others waste areas, also the highest numbers of kenophytes are found in natural biotopes (E, G, F, H) – *Ambrosia artemisiifolia* L., *Arabidopsis thaliana* (L.) Heynh., *Artemisia annua* L., *Bromus commutatus* Schrad., *Erigeron canadensis* L., *Erysimum cheiranthoides* L., *Iva xanthifolia* Nutt., *Grindelia squarrosa* (Pursh) Dun., *Microthlaspi perfoliatum* (L.) F.K. Mey, *Setaria viridis* (L.) P.Beauv, etc. There are relatively high numbers of alien species in same of the classes of natural vegetation, such as *Sedo-Scleretetea*, *Molinio-Arrhenatheretea*, *Festuco-Brometea*, *Rhamno-Prunetea*, etc.

Key words: Information system, Database, alien plant species

AN UPDATE ON THE DISTRIBUTION OF GLOBALLY INVASIVE *GAMBUSIA HOLBROOKI* IN TURKISH FRESHWATERS

Baran Yoğurtçuoğlu[1], *Fıtnat Güler Ekmekçi*[1]

[1]Hacettepe University, Faculty of Science, Biology Department, Beytepe Campus, Çankaya/Ankara, P.C. 06800, Turkey; yokbaran@gmail.com

The eastern mosquitofish (*Gambusia holbrooki*) is one of the worst invasive fish that introduced all over the world as malaria control agent. In this study, we update the distribution of *G. holbrooki* based on literature and field data. The current location data were arranged considering sampling date, region, water source and collectors. The database further processed and converted to shape files through Quantum GIS software and regional maps were created. Based on the results of this study, the gap of the location information of *G. holbrooki* is revealed for Turkish inland waters. This updatable database will further be used in niche modelling and future predictions on the distribution of the species.

Key words: invasive fish, distribution data, mosquitofish, GIS, Turkey

ALIEN CSI: INCREASING UNDERSTANDING OF ALIEN SPECIES THROUGH CITIZEN SCIENCE

Helen E. Roy[1], *Quentin Groom*[2]

[1] Centre for Ecology & Hydrology, Crowmarsh Gifford, Wallingford, United Kingdom; hele@ceh.ac.uk
[2] Meise Botanic Garden, Meise, Belgium

Plus *Tim Adriaens*, *Gaia Agnello*, *Marina Antic*, *Anne-Sophie Archambeau*, *Sven Bacher*, *Aletta Bonn*, *Peter Brown*, *Giuseppe Brundu*, *Bernat Claramunt López*, *Michelle Cleary*, *Dan Cogălniceanu*, *Maarten de Groot*, *Tiago De Sousa*, *Alan Deidun*, *Franz Essl*, *Živa Fišer Pečnikar*, *Anna Gazda*, *Eugenio Gervasini*, *Milka M. Glavendekic*, *Guillaume Gigot*, *Sven D. Jelaska*, *Jonathan M. Jeschke*, *Dariusz Kaminski*, *Paraskevi K. Karachle*, *Tamas Komives*, *Katharina Lapin*, *Frances Lucy*, *Elizabete Marchante*, *Dragana Marisavljevic*, *Riho Marja*, *Laura Martín Torrijos*, *Angeliki Martinou*, *Dinka Matosevic*, *Clare Marie Mifsud*, *Jurga Motiejūnaitė*, *Henn Ojaveer*, *Nataša Pasalic*, *Ladislav Pekárik*, *Esra Per*, *Jan Pergl*, *Vladimir Pesic*, *Michael Pocock*, *Luís Reino*, *Laurenţiu Rozylowicz*, *Christian Ries*, *Sven Schade*, *Snorri Sigurdsson*, *Ofer Steinitz*, *Nir Stern*, *Aco Teofilovski*, *Johann Thorsson*, *Rumen Tomov*, *Elena Tricarico*, *Teodora Trichkova*, *Konstantinos Tsiamis*, *Johan van Valkenburg*, *Noel Vella*, *Laura Verbrugge*, *Gábor Vétek*, *Cristina Villaverde*, *Johanna Witzell*, *Argyro Zenetos*, *Ana Cristina Cardoso*.

The challenges of gathering information on alien species (AS) are widely recognized. Recent developments in citizen science (CS) provide an opportunity to improve data flow and knowledge on AS while ensuring effective and high quality societal engagement with the issue of IAS (Invasive Alien Species). Advances in technology, particularly on-line recording and smartphone apps, along with the development of social media, have revolutionized CS and increased connectivity while new and innovative analysis techniques are emerging to ensure appropriate management, visualization, interpretation and use and sharing of the data. In early July 2018 we launched a European CO-operation in Science and Technology (COST) Action to address multidisciplinary research questions in relation to developing and implementing CS on AS. The Action will explore and document approaches to establishing a European-wide CS AS network. It will embrace relevant innovations for data gathering and reporting to support the implementation of monitoring and surveillance measures, while ensuring benefits for society and citizens, through an AS CS European network. We invite you to get involved with this exciting network.

Key words: Invasive alien species, biodiversity monitoring, public participation, scientific communication, visualisation and analysis

INVASIVESNET: INTERNATIONAL ASSOCIATION FOR OPEN KNOWLEDGE ON INVASIVE ALIEN SPECIES

Elena Tricarico[1], *Frances E. Lucy*[2], *Vadim E. Panov*[3], *Mark J. Costello*[4], *David Bruce Conn*[5,6], *Kit Magellan*[7], *Stelios Katsanevakis*[8], *Marnie L. Campbell*[9], *Eithne Davis*[2], *Laura N. H. Verbrugge*[10], *Laura Garzoli*[11]

[1]Department of Biology, University of Florence, Italy; elena.tricarico@unifi.it
[2]Centre for Environmental Research Innovation and Sustainability (CERIS), Institute of Technology, Sligo, Ireland
[3]Regional Euro-Asian Biological Invasions Centre, Helsinki, Finland
[4]Institute of Marine Science, University of Auckland, New Zealand
[5]Harvard University Museum of Comparative Zoology, Cambridge, Massachusetts, USA
[6]Berry College One Health Center, Mount Berry, Georgia, USA
[7]South African Institute for Aquatic Biodiversity, Grahamstown, South Africa
[8]Department of Marine Science, University of the Aegean, Greece
[9]Harry Butler Institute, Murdoch University, Australia
[10]University of Twente, Enschede, Netherlands
[11]National Research Council – Institute of Ecosystem Study CNR-ISE, Verbania, Italy

Invasive alien species (IAS) are recognised as one of the major threats to biodiversity, and their increasing ecological, social and economic impacts have driven the need for greater co-operation and information flow among scientists, management and the community of practice. Leading invasion biology scientists from five continents have thus created INVASIVESNET, an international association for

open knowledge and open data on IAS (https://www.invasivesnet.org). This new association will develop a sustainable network of networks on IAS. INVASIVESNET links networks of all interested stakeholders including scientists, citizens, international and national expert working groups and initiatives, database managers, thematic open access journals, environmental agencies, practitioners, managers, industry, non-government organisations and educational bodies. The association will promote networking opportunities, knowledge sharing and learning and provide resources via high quality communication, information, publication and education services. Membership in INVASIVESNET is open to individuals and organizations wishing to participate in promoting the objectives of the association. The benefits of INVASIVESNET membership are: 1) unique networking opportunities; 2) eligibility to support from the INVASIVESNET Open Access Publishing Fund; 3) unrestricted access to the INVASIVESNET webpages; and 4) eligibility to place news items in INVASIVESNET media.

Key-words: invasive alien species, network, association, scientists, stakeholders

TOPIC 7: OTHER TOPICS

THE USAGE OF INVASIVE SPECIES AND THEIR IMPACT ON HUMAN HEALTH

Altuğ Çiçekliyurt[1]

[1] Karabiga Health Care Center, Çanakkale, Turkey; draltuk@hotmail.com

Traditional use or individual experience of plant components or herbal extracts without scientific knowledge or expert opinion may be cause of unwanted side effects or drug-bioactive component interaction. Invasive species are spread in non-natural area and disrupts the ecosystems by its ability to invasion. Beside the medicinal values of invasive plants, usage of them can be potentially toxic.

The aim of this study is to evaluate the usage of invasive alien species as food additive or medical purpose in Karabiga. For that purpose, the patients were kindly requested to write down the herbs that are use or preferred to use during diet or medical purpose. Hundred patients were enrolled for the study during their visit in our patient clinic.

Study population were enrolled from Karabiga Health Care Center. Karabiga is a rural area so the village is more prone to use herbs or its extracts in Daily life.

The results have been shown that many invasive species have been widely used for medical purpose. Some of them as follows: *Althaea officinalis* is traditionally used as a treatment for cough reflex, in contrast the patients who use antidiabetic drugs or lithium must be aware of drug-herb interactions; *Rhamnus cathartica* is another poisonous herb which is widely used for its diarrhoea, yet excess usage of plant results dramaticly decrease in body potassium level by that way cause cardiovascular problems; *Hypericum perforatum* is another widely used plant for for treating depression and other mood disorders in addition dermatological purpose (burns, pain sensations).

In this study, invasive plant species and their medical usage are evaluted by survey in rural area (Karabiga) in Turkey and the potential risk on human health are hightlighted.

Key words: Invasive species, Çanakkale, Karabiga

ENTOMOPATHOGENS AGAINST MOSQUITOES (DIPTERA: CULICIDAE)

Manana Lortkipanidze[1], *Kazim Huseynov*[2], *Oleg Gorgadze*[1], *Mzia Kokhia*[1], *Madona Kuchava*[1]

[1] Department of entomopathogens, Ilia State University, Institute of Zoology, Tbilisi 0162, Georgia; manana.lortkipanidze@iliauni.edu.ge
[2] Azerbaijan State Agricultural University, 19 Javadkhan, 2000, Ganja, Azerbaijan

In the recent years, as a result of the increase of anthropogenic influence on the environment, global ecological changes have taken place – climatic rise in temperature, soil erosion, deforestation, desertification etc. We face a rapid increase of pathogenic microorganisms which cause various infections such as malaria, yellow fever, dengue, rift, etc., causing great economical damage to many countries. Biological control with entomopathogens can provide a good control of pests, reduce the population of mosquitoes and decrease damage to human health. The efficacy of entomopathogenic nematodes (EPNs) of the species *Steinernema feltiae* and bacterial pesticides: *Bitoxybacillin* (*BTB*), *Thuringin-2* and *Dipel* were evaluated in the control of two species of mosquitoes: *Anopheles maculipennis* and *Culex pipiens molestus* in the laboratory conduction.

The mosquitos' mortality grew with increase of concentration of bacterial pesticides. On the 5th day with the high concentration of *Thuringin-2* and *Dipel*, mortality rate of insects increased, although did not reach 100%.

It can be concluded that suspension of entomopathogenic nematodes of the species *S. feltiae* with dose 100 IJs /per larvae showed slight activity (36%-40%), compare with bacterial pesticides toward the larvae of the indicated mosquito species where the mortality ranged from 45-100%.

More effective were the action of bacterial pesticides *BTB*, *Turingin-2* and *Dipel*, the mosquito's mortality grew with increase of concentration. The mosquito's larvae were most sensitive to highest (0.5) concentration of bacterial pesticide *BTB*.

Our results indicate that generally biological agents are regarded as one of the best means, for biological control and successfully used against different species of mosquitoes.

Key words: entomopathogenic nematodes, bacterial pesticides, *Anopheles maculipennis*, *Culex pipiens molestus*

ANTIFUNGAL ACTIVITY OF SOME PLANT EXTRACTS ON NON-CANDIDA ALBICANS SPP. STRAINS ISOLATED FROM HOSPITALIZED PATIENTS

Dunya A. Al-Kurjiya[1], *Haifa Najee*[1], *Marcela Popa*[1,2], *Omar Sadik Shalal*[1], *Othman Al-Mahdawy*[1], *Grigore Mihăescu*[1], *Mariana Carmen Chifiriuc*[1,2]

[1]University of Bucharest, Faculty of Biology, Bucharest, Romania; bmarcelica@yahoo.com
[2]Research Institute of the University of Bucharest M. Kogălniceanu 36-46, sector 5, 050107, Bucharest, Romania

Background: medicinal plants are widely used throughout the world since these plants are known to have minimal side effects. This study aims to investigate the antifungal effects of some local plant extracts on non-*Candida albicans* spp. (NCA) strains isolated in 2017 from infections occurred in hospitalized patients.

Materials and Methods: The antimicrobial activity of plant extracts obtained by hydrodistillation from *Silybum marianum, Chelidonium majus, Tamarix ramosissina* and *Glycyrrhiza glabra* was assessed on a total of 8 NAC isolates, respectively *Candida glabrata, Candida tropicalis, Candida krusei, Candida famata, Candida guilliermondii, Candida lusitaniae, Candida kefyr* and *Candida parapsilosis* isolated from patients admitted to one hospital from Romania and on three ATCC reference strains. Qualitative disk diffusion and quantitative broth microdillution methods (minimal inhibitory concentration-MIC) and microtiter method (minimal biofilm eradication concentration – MBEC) methods were used. Nystatin and miconazole (50 μg mL) were used as positive controls. The tests were performed in triplicate.

Results: In relation to the antifungal agents used as controls, it was observed that all NAC strains were susceptible to miconazole, but resistant to nystatin. All NCA clinical strains exhibited the highest susceptibility as revealed by the lowest MIC and MBEC values to *Tamarix ramosissina*, followed by *Chelidonium majus* extract.

Conclusion: The hydro-alcoholic extracts of *Tamarix ramosissina* and *Chelidonium majus* extracts show promising activity against the drug resistant NCA, both in planktonic and biofilm growth state, further studies on larger number of strains and identification of the plant compounds responsible for the antifungal activity being required to validate the obtained results

Key words: non-*Candida albicans* spp. strains, antifungal activity, hydro-alcoholic plant extracts

BIOEVALUATION OF *CUSCUTA CAMPESTRIS* TOTAL EXTRACTS FOR POTENTIAL THERAPEUTIC APPLICATIONS

Irina Zarafu[1], *Petre Ioniță*[1,2], *Maria Marinescu*[1], *Marcela Popa*[3,4], *Luminița Măruțescu*[3,4], *Mariana Carmen Chifiriuc*[3,4], *Paulina Anastasiu*[3,4,5]

[1]University of Bucharest, Faculty of Chemistry, Department of Organic Chemistry, Biochemistry and Catalysis, 90-92 Panduri, Bucharest, Romania; zarafuirina@yahoo.fr
[2]Institute of Physical Chemistry, 202 Spl. Independenței, Bucharest, Romania
[3]University of Bucharest, Faculty of Biology, 91-95 Spl. Independenței, Bucharest, Romania
[4]Research Institute of the University of Bucharest, Bucharest, Romania
[5]Botanic Garden ,,D.Brandza", (GBDB) of the University of Bucharest, Bucharest, Romania

Cuscuta campestris Yunck. (fam. Convolvulaceae) is an herbaceous annual parasitic plant originated from North America. This plant was introduced to Europe about 1900 and now it is widespread in many of the countries, including in Romania where is reported as invasive species. The aim of the study was to assess the influence of four *Cuscuta campestris* total extracts (in methanol, ethanol and water) against the planktonic and biofilm growth of four bacterial reference strains (*E. coli* ATCC 25922, *P. aeruginosa* ATCC 27853, *S. aureus* ATCC 25923, *E. faecalis* ATCC 29212). Broth microdilution and microtiter assays were used to determine the minimal inhibitory concentration (MIC) and minimum biofilm eradication concentration (MBEC). Minimum bactericidal concentration (MBC) values were established by conventional plating method. In the quantitative assay, the *Cuscuta campestris* extracts exhibited growth inhibitory effect against the all tested bacteria, with MIC values ranking from (225 μL/mL (against *E. faecalis* ATCC 29212) to 56.25 μL/mL (against *P. aeruginosa* ATCC 27853). The results demonstrated that the extracts were also able to reduce the biofilm development. The biofilms of *P. aeruginosa* ATCC 27853 and *S. aureus* ATCC 25923 were more susceptible (MBEC values of 112,5 μL/mL) than the biofilms of *E. coli* ATCC 25922 and *E. faecalis* ATCC 29212 (MBEC values of 225 μL/mL). The *Cuscuta campestris* extracts exhibited a low antibacterial and antibiofilm activity.

Key words: *Cuscuta campestris* Yunck., antibacterial activity, antibiofilm activity

CORE-SHELL NANOPARTICLES FUNCTIONALIZED WITH ESSENTIAL OILS WITH ANTIMICROBIAL ACTIVITY

Alina M Holban[1,2], Alexandru M Grumezescu[1,2], Ghiță Bianca[1], Mănăstireanu Denisa[1], Hamzah Basil Mohammed[1], Sajjad Mohsin[1], Mariana Carmen Chifiriuc[1], Veronica Lazăr[1], Ecaterina Andronescu[2]

1 Research Institute of the University of Bucharest, 36-46 Bd. M. Kogalniceanu, 050107, Bucharest, Romania; alina_m_h@yahoo.com

2 Department of Science and Engineering of Oxide Materials and Nanomaterials, Faculty of Applied Chemistry and Materials Science, Str. Gheorghe Polizu, no 1-7, 011061, Politehnica University of Bucharest, Romania

Due to the emerging problem of antimicrobial resistance, novel therapeutic options are intensively investigated. The aim of this study was to investigate the impact of some newly synthesized magnetite nanoparticles (NPs) functionalized with essential oils (EOs) on the viability and virulence of relevant opportunistic microbial species (*Staphylococcus aureus, Bacillus cereus, Escherichia coli, Pseudomonas aeruginosa, Candida albicans*). Functional NPs were obtained by co-precipitation and phisico-chemically characterized by TEM, SEM, IR, XRD. Antimicrobial effect was tested by qualitative (spot method) and quantitative (microdilution method) assays, attachment was assessed by modified Cravioto methods, biofilm formation was analyzed by an adapthed microdilution approach, while the production of soluble virulence factors was analyzed by culturing the microbial strains exposed to nanoparticle treatment on various biochemical contained in specific media. Results demonstrated that tested NPs have different MIC (minimum inhibitory concentrations), depending on the tested strain, their antimicrobial effect being more obvious against the Gram negative and yeast tested strains and less pronunced against tested Gram positive species. Most of the tested NPs modulated the attachment and biofilm formation of more than 70% of all tested strains, when utilized at sub-inhibitory concentrations (CMI/2). Production of soluble virulence factors was not or slightly modulated in the tested conditions. The most significant antimicrobial effects were observed in the case of nanoparticles functionalized with *Eugenia caryophyllata* and *Eucaliptus* sp. EOs. In conclusion, these nanoparticles functionalized with antimicrobial EOs may be considered efficient alternatives in fighting infections and also to modulate microbial virulence without necessary killing the microbial cells, thus limiting the selective pressure of antimicrobial resistance selection.

Key words: essential oils functionalized nanoparticles, natural antimicrobials, virulence modulation, infection control

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PREVALENCE OF POTATO TUBER NEMATODE IN TETRITSKARO (EASTERN GEORGIA)

Eka Tskitishvili[1,2], *Eter Buchukuri*[1], *Lali Jgenti*[3], *Nana Bagathuria*[1], *Tamaz Tskitishvili*[1], *Medea Gigolashvili*[1], *Irakli Eliava*[1]

[1] Ilia State University. Institute of Zoology. Department of Nematology. K. Cholokashvili Ave. 3/5 0162,Tbilisi, Georgia; eka.tskitishvili@iliauni.edu.ge; ebuchukuri@gmail.com
[2] Georgian Technical University. Faculty of Agricultural Sciences and Biosystems Engineering, Tbilisi, Georgia
[3] Batumi Rustaveli State University, Faculty of Natural Sciences and Health Care, Ninoshvili 35, 6010, Batumi, Georgia; lalikajgenti@gmail.com

In terms of global production, potato (*Solanum tuberosum* L.) is the fourth most important food crop after corn, rice and wheat. This crop is grown throughout the world.

Recognizing the problems that nematodes cause in potato crops due to their pathogenic action as well as to their biogeographical characteristics is basic since tubers used for planting, can be a key factor in their dissemination.

A study on nematode population fluctuations was carried out during a one year period in five potato growing sites in Tetritskaro counties. Emphasis must also be placed on the potato rot nematodes, because *Ditylenchus destructor* and *Ditylenchus dipsaci* are economically important plant parasitic nematodes, affecting potato production mostly in temperate climates and these nematodes are listed as quarantine pests in many countries. Management through crop rotation is not feasible because of their wide host range.

The material was collected in full vegetation period. The soil samples were also tested after harvest and before planting, as initial population densities of *D. destructor* and *D. dipsaci* has significant influence on potato tuber damage.

During the research process in the studied ecosystems there were registered 110 forms of Free-living and Phyto-parasitic nematodes, from which 65 forms are determined as species, as familie 3, as genus 40. The registered nematodes belong to 8 orders 34 families and 56 genera.

Ditylenchus destructor was the most prevalent and abundant plant-parasitic nematode in studied ecosystems. The highest rate of its number 45,22% is established in Iraga and the lowest 0,75 % in Dubeebi. *Ditylenchus dipsaci* was not detectable in research territory. Before planting percentage of *D. destructor* in soil samples was very low. After harvesting it has increased to 24%. Based on results of research it is possible to assume, that increase in number of a pathogen in the soil is a result of invasive sowing material.

Key words: Georgia, parasitic, nematoda, potato, prevalence

INFLUENCE OF AQUEOUS EXTRACTS OF THREE PLANT SPECIES ON MICROBIAL GROWTH IN PLANKTONIC AND BIOFILM STATE

Irina Zarafu[1], *Petre Ioniță*[1,2], *Maria Marinescu*[1], *Sorin Avramescu*[1], *Marcela Popa*[3,4], *Luminița Măruțescu*[3,4], *Paulina Anastasiu*[3,4,5], *Mariana Carmen Chifiriuc*[3,4]

[1]University of Bucharest, Faculty of Chemistry, Department of Organic Chemistry, Biochemistry and Catalysis, 90-92 Panduri, Bucharest, Romania; zarafuirina@yahoo.fr

[2]Institute of Physical Chemistry, 202 Spl. Independenței, Bucharest, Romania

[3]University of Bucharest, Faculty of Biology, 91-95 Spl. Independenței, Bucharest, Romania

[4]Research Institute of the University of Bucharest, Bucharest, Romania

[5]Botanic Garden ,,D. Brandza" of the University of Bucharest, Bucharest, Romania

Aqueous extracts of *Paeonia peregrina* Mill., *Lilium candidum* L. and *Aloysia citriodora* Palau were tested for their antimicrobial and antibiofilm activity against four bacterial reference strains (*Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Staphylococcus aureus* ATCC 25923, *Enterococcus faecalis* ATCC 29212). Broth microdilution and microtiter assays were used to determine the minimal inhibitory concentration (MIC) and minimum biofilm eradication concentration (MBEC). Minimum bactericidal concentration (MBC) values were established by conventional plating method. The aqueous extracts of *P. peregrina* inhibited all the tested bacteria, with MIC values ranking from 112.5 μL/mL (against *S. aureus* and *E. coli*) to 28.1 μL/mL (against *E. faecalis*). *L. candidum* extracts presented lower inhibitory activity compared to *P. peregrina* with MIC ranking from 450 to 225 μL/mL. *A. citriodora* had a good inhibitory activity against *P. aeruginosa* (MIC value of 112.5 μL/mL). The tested extracts also inhibited biofilm formation at concentrations similar to MICs. Amongst the tested extracts, *P. peregrina* has exhibited the best inhibitory activity.

Key words: aqueous extracts, antibacterial activity, antibiofilm activity

BIOEVALUATION OF THE ANTIMICROBIAL PROPERTIES OF *BERBERIS VULGARIS* EXTRACTS

Irina Zarafu[1], *Petre Ioniță*[1,2], *Maria Marinescu*[1], *Sorin Avramescu*[1], *Marcela Popa*[3,4], *Luminița Măruțescu*[3,4], *Mariana Carmen Chifiriuc*[3,4], *Paulina Anastasiu*[3,4,5]

[1]University of Bucharest, Faculty of Chemistry, Department of Organic Chemistry, Biochemistry and Catalysis, 90-92 Panduri, Bucharest, Romania; zarafuirina@yahoo.fr

[2]Institute of Physical Chemistry, 202 Spl. Independenței, Bucharest, Romania

[3]University of Bucharest, Faculty of Biology, 91-95 Spl. Independenței, Bucharest, Romania

[4]Research Institute of the University of Bucharest, Bucharest, Romania

[5]Botanic Garden ,,D. Brandza" of the University of Bucharest, Bucharest, Romania

The aim of the study was to assess the influence of four *Berberis vulgaris* total extracts (in methanol, ethanol and water) against the planktonic and biofilm growth of four bacterial reference strains (*Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Staphylococcus aureus* ATCC 25923, *Enterococcus faecalis* ATCC 29212). The antimicrobial activity against planktonic microbial cells was assessed by broth microdilution (minimal inhibitory concentration-MIC) and viable cell counts after plating on solid media (minimal bactericidal concentration- MBC). The antibiofilm activity was performed by the microtiter assay using violet crystal staining of microbial biofilms (minimal biofilm eradication concentration-MBEC). The extracts of *B. vulgaris* proved to be active only against the Gram negative *P. aeruginosa* strain (MIC value 225 μL/mL). The antibiofilm activity of the respective extract was similar to its inhibitory activity against the planktonic form of the bacteria. However, further studies will be performed in order to establish the correlation between the observed biological activity and the chemical composition of different extracts.

Key words: *Berberis vulgaris*, antibacterial activity, antibiofilm activity

PROBLEMS RELATED TO AQUATIC ALIEN PLANTS IN TURKEY

İlhan Üremiş[1], *Necmi Aksoy*[2], *Ahmet Uludağ*[3]

[1] Mustafa Kemal University, Hatay, Turkey

[2] Faculty of Forestry & DUOF Herbarium, Düzce UniversityDüzce, Turkey

[3] Plant Protection Department, Faculty of Agriculture, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

Turkey has very rich flora with over 10.000 plant species, which the richness reflects to aquatic species in general and weed flora. There are aquatic alien specimens collected during former local and regional floristic studies and they have been preserved in herbaria of Turkey (for instance, DUOF). In addition to the herbaria records, the related literature and cheek-lists were investigated to determine alien

aquatic plants. The number of species has been considered as aquatic weeds in Turkey is 742, which are 43 Thallophyta, 2 Bryophyta, 6 Pteridophyta (Pterophyta) ve 691 Angiospermae. They can be classified as 22 algae, 12 free-floating plants, 22 floating-leaf plants, 74 submersed plants, and 612 emergent plants. The recent alien flora of Turkey reports few aquatic alien species that are *Azolla filiculoides* Lam., *Egeria densa* Planch., *Eichhornia crassipes* (Mart.) Solms, *Elatine ambigua* Wight, *Elodea canadensis* Michx., *Hydrocotyle ramiflora* Maxim., *Ludwigia peploides* (Kunth) P.H. Raven, *Myriophyllum spicatum* L., and *Myriophyllum verticillatum* L.. Most of the alien aquatic plants recorded from Turkey are originated from mainly far east Asia, America and Australia. Some of these species such as *A. filiculoides*, *E. densa*, *E. crassipes* invasive alien plants lists and different species of some genus such as *Myriophyllum, Ludwigia*, and *Elodea* in EPPO (European and Mediterranean Plant Protection Organization). There is no any risk assessment on aquatic alien species in Turkey. Their risks and impacts should be studied as well as management which is not implemented properly due to neglecting.

Key words: Aquatic plants, invasive alien plants, Turkey, database, management

AILANTHUS ALTISSIMA AND *AMBROSIA ARTEMISIIFOLIA*, TWO INVASIVE SPECIES IN COCORA'S VEGETATION (IALOMITA COUNTY)

Marian Constantin[1,2]

[1]Institute of Biology – Bucharest, 296 Splaiul Independentei, 060031 Bucharest, Romania; cvgmarian@gmail.com
[2]Research Institute of the University of Bucharest, 36-46 Bd. M. Kogalniceanu, 050107, Bucharest, Romania

Invasive species tend to occupy areas populated by native species, living together for a while, and then replacing them altogether. In Cocora, Ialomița County, *Ailanthus altissima* (Mill.) Swingle (cenușer or fals oțetar, in romanian, or tree of heaven, in english), a species introduced some time ago for ornamental purposes, is a little widespread, usually in the vicinity of cultivated trees, unlike other localities where its tendency is to become very widespread. In Cocora, its wood is used to house heating, and its expansion is very limited. On the other hand, it is very concerning the continuous expansion of the area occupied by *Ambrosia artemisiifolia* L. (ambrozie, în romanian, or ambrosia, in english), whose pollen contains some toxins that cause allergies to humans. In C ocora, the first report of this species was in 2010, when a list of plant species for the locality was made. Then ambrosia was found only in the sou-

theast, on the edges of the road between Cocora and Căzănești, and in 2017 the plant extended to the edges of the road between Cocora and Colilia and to one of the roads in the north of the locality. In fact, ambrosia forms very dense fields on the edges of the Cocora and Căzănești road, on some segments replacing the spontaneous vegetation altogether. The trend of expanding the area of ragweed observed in Cocora is framed by its general tendency in Romania, where it has become a common presence on the edges of roads and railways.

Key words: invasive plants, Cocora, Ialomiţa County, ambrosia expansion

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