



THE INVASIVE PLANTS WORKING GROUP OF THE EWRS WORKSHOP “OUR PATH AFTER COVID-19” PROCEEDINGS

Editors

Ahmet ULUDAĞ
Bojan KONSTANTINOVIĆ
Milena POPOV
Tijana STOJANOVIĆ

September 23-24, 2021.
Palić, Serbia

The Invasive Plants Working Group of the EWRS Workshop

“Our path after Covid-19”

- Proceedings -

Editors

**Ahmet ULUDAĞ
Bojan KONSTANTINOVIĆ
Milena POPOV
Tijana STOJANOVIĆ**

September 23-24, 2021

Palić, Serbia

How to cite

The Invasive Plants Working Group of the EWRS workshop “Our path after Covid-19” Proceedings, September 23-24, 2021, Palić, Serbia, Edited by Uludağ A, Konstantinović B, Popov M, and Stojanović T.

Keywords

Invasive Alien Plants, Weeds, Biological Control, Epigenetics, Genetics, Distribution, EICAT, Management, Ecology

ISBN: 978-625-00-9596-6

Organized By

EWRS IP WG

University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Novi Sad, Serbia

Supported by

EWRS

Faculty of Agriculture, ÇOMÜ, Turkey

Organizing Committee

Ahmet ULUDAĞ

Bojan KONSTANTINOVIĆ

Milena POPOV

Tijana STOJANOVIĆ

Scientific Committee (In alphabetical order)

Ahmet ULUDAĞ

Bojan KONSTANTINOVIĆ

Christian BOHREN

Heinz MÜLLER-SCHÄRER

Sava VRBNIČANIN

FOREWORD

We are today in a totally changing world due to the pandemic and the unbelievable advances in technology and science. There are many questions arising from the current situation. In the last two years, we have moved less and became more dependent to online life including our daily habits. The climate change is still threatening the whole world with its predictable and unpredictable results. The unmanned vehicles, the robots and robotics are more and more becoming a part of our lives day by day, as well as the artificial intelligence and the other related issues invading our life and occupying our jobs/works. The questions for our WG are how invasive alien plants will behave, how will we proceed to deal with invasive alien plants, how much new advancements mentioned above will affect our subjects, so on. Our first meeting after Covid-19 will be a workshop and focus on our new pathway.

The meeting had two main areas: One is the advancements and history of the invasive alien plants, their control, policies, and science. The second one was what can be our contribution to sustain the world with our works on the invasive alien plants and how we can include the new advancements in our works. We held brainstorming sessions to be more active in the weed science and invasion science activities. We hope that we can apply and implement some common projects and activities as we discussed and decided on our path after Covid-19.

The meeting was held in Palić which is a small town in Vojvodina, Serbia. Twenty-two of us (two of them online) had a fruitful meeting in this peaceful environment. The concrete outcomes of the meeting can be seen in the abstracts of the presentations and the Palić Report which we compiled as the outcome of the brainstorming sessions.

The Organizers

This page is left blank intentionally

PROGRAM

23 September 2021

10:00-10:30 Opening Ceremony

10:30-12:30 Opening Lectures (**Chairman Sava VRBNIČANIN**)

The role of epigenetics on the rapid adaptation of invasive plant species/weeds
Presenter **Mehmet ARSLAN**

Fighting neobiota with neobiota: do it more rigorously and more often
Presenter **Heinz MÜLLER-SCHÄRER**

EWRS IAP WG's history and an outlook
Presenter **Christian BOHREN**

12:30-14:00 Lunch Break

14:00-15:30 Discussion 1 (**Chairman Christian BOHREN**)

The status of WG in IAP research (What happened on IAP research and what have been our contributions as WG and members)

15:30-16:00 Poster Session (**Chairman Milena POPOV**)

1. Altitudinal effects on plant invasions in riparian areas of Serbia
2. Efficacy of different glyphosate formulations against the invasive weed *Solanum elaeagnifolium* Cav.
3. Genetic diversity of populations of *Phalaris arundinacea*: case study near the Baltic Sea
4. Genetic parameters of populations of *Lythrum salicaria* growing within some areas of natural distribution range
5. Nutrition peculiarities of populations of *Phalaris arundinacea* in relation to biotic and abiotic factors of environment
6. Environmental factors determining the shoot density of *Ambrosia psilostachya*, an invasive alien perennial species in northern Iran

16:00-18:00 Discussion 2 (**Chairman Ahmet ULUDAĞ**)

Direction of WG in IAP research (Which issues on IAP will be more prominent in coming decade, what role should be taken by WG and its members)

24 September 2021

09:20-10:20 Session 1(Chairman Bojan KONSTANTINOVIĆ)

Combining the Environmental Impact Classification for Alien Taxa (EICAT) scores with habitat suitability maps for invasive alien plants in Iran: getting closer to predicting impact at the regional scale

Presenter: **Mostafa OVEISI**

Molecular diversity of *Impatiens parviflora* populations from Lithuania

Presenter: **Eugenija KUPČINSKIENĖ** (Online)

Potential of imidazolinone (IMI) resistant chickpea cultivars to control invasive weed species

Presenter: **Doğan IŞIK**

10:20-11:20 Discussion 3 (Chairman Heinz MÜLLER-SCHÄRER)

What can be our common work

11:20-12:40 Session 2 (Chairman Mostafa OVEISI)

Invasive plant species and the Trans-Siberian Railway – back and forth

Presenter: **Maria GALKINA**

First report of *Amaranthus palmeri* S. Wats. in cotton, maize, and sorghum in Greece

Presenter: **Alexandros TATARIDAS**

Invasive weeds on the canal network of Vojvodina

Presenter: **Nataša SAMARDŽIĆ**

Tree of heaven in vineyards

Presenter: **Ahmet ULUDAĞ**

12:40-14:00 Lunch Break

14:00-15:00 Discussion 4 (Chairman Ahmet ULUDAĞ)

Paliç Report

15:00-16:00 Wrap up and closing

This page is left blank intentionally

INVITED PRESENTATIONS

This page is left blank intentionally

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

THE ROLE OF EPIGENETICS ON THE RAPID ADAPTATION OF INVASIVE PLANT SPECIES/WEEDS

Mehmet ARSLAN¹, Ahmet ULUDAĞ², İlhan ÜREMİŞ³, Necmi AKSOY⁴

¹Faculty of Agriculture, Erciyes University, Kayseri, Turkey

²Faculty of Agriculture, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

³Faculty of Agriculture, Hatay Mustafa Kemal University, Antakya, Turkey

⁴Faculty of Forestry, Düzce University, Düzce, Turkey

Invasive plant species can easily adapt themselves in different habitats although each environment represents its own floral and faunal species diversity. For a long time, it was thought that the rapid adaptation of invasive plants was due to genetic factors. However, recent advances in weed science have emphasized the role of epigenetics in rapid adaptation of invasive species. The dynamic and reversible features of epigenetic modifications have attracted many attentions in epigenetic mechanisms to develop novel management strategies to prevent the spread of the invasive species. Epigenetic mechanisms regulate the gene expressions that enable an invasive species to adjust themselves to the changing environments. Epigenetic processes such as DNA methylation, histone modifications, chromatin configuration and actions of non-coding RNA species increase the functional complexity of DNA without a change in the DNA sequence that rapidly modifies genomes and gene expressions. These modifications play important roles for driving phenotypic plasticity, differential adaptation and diversification of invasive species. This presentation describes the role of epigenetic in rapid adaptation of invasive alien species and connection between the epigenetics and environmental factors.

Key words: Rapid adaptation, Genetics, Phenotypic plasticity, Diversification, Environment

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**FIGHTING NEOBIOTA WITH NEOBIOTA: DO IT MORE
RIGOROUSLY AND MORE OFTEN**

Yan SUN¹, Heinz MÜLLER-SCHÄRER¹, Urs SCHAFFNER²

¹ Department of Biology, University of Fribourg, CH-1700 Fribourg, Switzerland

² CABL, CH-2800 Delémont, Switzerland

Invasion science has developed into a rapidly expanding discipline within general ecology over the past decades, yet little progress has been made to understanding causes of impact and to developing management tools, particularly against invasive non-native plants (INNP). INNP cause severe impacts on nature and human well-being and these are predicted to increase further. While management tools have been developed to control early-stage invasions, they are only rarely available for large-scale invasions. Importation biological weed control (IBWC) offers a potentially effective tool, especially when combined with other sustainable land management interventions. I will first present a decision tree to identify opportunities and needs for IBWC. I will then reply to concerns raised against IBWC by contrasting historical approaches with recently suggested improvements.

The introduction and deliberate release of specialist natural enemies, mostly insects and pathogens, from the weed's native range, also has a policy implication, as it needs authorization by national authorities. Many new world countries have widely adopted IBWC since decades, while regulations are only now underway in countries in Asia, Africa and Europe.

Two case studies illustrate that IBWC is more than just reducing weed densities, as it also significantly contributes to environmental health and human well-being by affecting various sectors. Finally, I will outline a path forward to increase efficacy and safety in future IBWC projects and conclude by advocating to do IBWC more rigorously and more often, as threats imposed by INNP are urgently awaiting sustainable and affordable solutions.

Key words: Biological weed control, One health, Natural enemies

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

EWRS IAP WG’S HISTORY AND AN OUTLOOK

Christian BOHREN

first chair of EWRS Working Group Invasive Plants 2006 – 2019

In view of the actual discussions on globalization and its effects on agriculture especially by plant invasions, EWRS decided to promote a new Working Group “Invasive Plants” – finally established in winter 2006 in Nyon, Switzerland. The WG aims are until today: creating a platform for exchange of scientific and practical knowledge about management of invasive plants. Included is on one hand the support of development of adapted control methods of environmental weeds in natural environment and on the other hand promotion of research and knowledge transfer for tailored control methods of invasive weeds in agricultural areas. Organizing regular meetings open for all interested and involved people and assisting education and training on invasive plants management for students, and professionals, agricultural and non-agricultural as well as other stakeholders are the tools to follow up with the WG mission.

The 1st meeting of the WG was held 2006 at the University of Punta Delgada (local organizer Louis Silva) in collaboration with the International Bracken Group (IBG) and the EWRS WG “Biological Control” with around 70 delegates mainly from the Pacific region, South America, and Europe. The 2nd meeting was held at the J.J. Strossmayer University in Osijek, Croatia (local organizer Edita Stefanic) together with EWRS WGs “Biological Control” and “Weed Management in Arid and Semi-arid Climates”. Main subject for nearly 70 participants from mainly Europe (EPPO, CABI) was *Ambrosia artemisiifolia* with the result of a “call for action” together with the International Ragweed Society IRS. Meeting nr. 3 – from now on called “Symposium on environmental weeds and invasive plants” – held 2011 in Ascona, Switzerland (local organizer Marco Conedera, WSL, Swiss Federal Institute for Forest, Snow and Landscape Research) was dedicated to the management of invasive plants in massively disturbed natural environment. 100 participants from all continents followed the meeting, while 120 locals participated in an evening event for information to the public. The 4th symposium in Montpellier, France in 2014 (local organizer Guillaume Fried, ANSES) was held for broadening the scope to include the entire Mediterranean basin. 120 participants created a pleasant atmosphere for discussions and social contacts. Due to political reasons the 5th symposium could not be held 2017 as announced in Turkey but later in Chios, Greece (local organizers Garifalia Economou and Ahmet Uludag) with the

collaboration of EWRS WGs “Weed mapping” and “Germination and Early Growth”. 32 participants ensured lively discussions.

Fruitful collaborations had been established with EPPO (Sarah Brunel - 2nd International Workshop on Invasive Plants in the Mediterranean Type Regions of the World, 2010), EUPHRESKO Ambrosia, COST SMARTER (Heinz Müller Schärer) and International Ragweed Society IRS, as well as Neobiota (Montserrat Vilà and Christian Ries) meetings 2014 in Antalya, TR (with special WG IP session) and 2016 in Vianden, LUX (with EWRS info). A collaboration with Seppo Hellsten and Arnold Pieterse from SYKE revitalized 2009 the series of regular meetings for aquatic weeds specialists in organizing the 12th International Symposium on Aquatic Weeds in Jyväskylä, FIN.

Experience has shown that local impressions on problems with invasive plants are irreplaceable. Certainly, the Covid-19 pandemic has changed a lot in the world. For the time being, big events with hundred and more participants may not be adequate in the nearer future. Nevertheless, problems created by invasive plants have not changed – in contrary they may have become more serious.

It could be an idea for the working group to intensify the email or skype exchange and to support with budget and knowledge small ad hoc group meetings (< 10 participants), which might not be forced to timely related planning of other WGs or EWRS events.

Finally, the Working Group logo symbolizes specific management (red arrow with mention of participating EWRS working groups) to invasive species (circle symbolizing *Solidago canadensis*), location and year of the meeting are indicated.



Key words: beginnings, meetings, local organizers, contacts, future

ORAL PRESENTATIONS

This page is left blank intentionally

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**COMBINING THE ENVIRONMENTAL IMPACT
CLASSIFICATION FOR ALIEN TAXA (EICAT) SCORES WITH
HABITAT SUITABILITY MAPS FOR INVASIVE ALIEN
PLANTS IN IRAN: GETTING CLOSER TO PREDICTING
IMPACT AT THE REGIONAL SCALE**

**Mostafa OVEISI^{1,2}, Ahmad FARZANEH¹, Taiebeh ADELI³, Yan SUN⁴, Sven BACHER⁴,
Heinz MÜLLER-SCHÄRER^{1,4}**

1 Department of Agronomy and Plant Breeding, Faculty of Agriculture and Natural Resources, University of Tehran, Karaj, Iran. 2 Visiting scientist at the Department of Biology, University of Fribourg, Fribourg, Switzerland.

3 Department of Agronomy, Faculty of Agriculture, University of Kurdistan, Sanandaj, Iran.

4 Department of Biology, University of Fribourg, Fribourg, Switzerland.

Invasive alien plants are reported to have multiple ecosystem impacts including alterations in plant-plant, plant-insect and plant-microbe interactions and reductions in biodiversity. Iran has distinct climate zones containing protected areas that are prone to be invaded by alien species. To reach an updated list of invasive alien plants and potential invasive plants of Iran, we made a comprehensive literature review for alien plant species reported from Iran and neighboring countries searching through Iranian, Scopus, Web of Science, CABI and GBIF data bases. We firstly reached a list of 126 alien plant species of which 5 species have become invasive i.e. showed a tendency to spread out of control, 90 species established which reported to be invasive in other countries, and 31 species having become naturalized in Iran. We also established a list of 71 species that are invasive in neighboring countries, but not yet naturalized in Iran or with an unknown status. The EICAT scoring for the listed plant species is in progress. We simultaneously predict the habitat suitability of these species using spatial distribution modelling (SDM). The map of EICAT scores will be then overlaid with the habitat suitability map of invasive or potential invasive plants to reach a combined SDM*EICAT results that achieve more realistic predictions amenable to management implications at regional scale.

Key words: Invasive plants, EICAT, SDM

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**MOLECULAR DIVERSITY OF *IMPATIENS PARVIFLORA*
POPULATIONS FROM LITHUANIA**

Edvina KROKAITĖ¹, Lina JOCIENĖ¹, Rasa JANULIONIENĖ¹, Tomas REKAŠIUS^{1,2},
Eugenija KUPČINSKIENĖ¹

¹Vytautas Magnus University, Kaunas, Lithuania

²Gediminas Technical University, Vilnius, Lithuania

Nowadays more and more attention is paid to elucidate genetic characteristics which ensure success of invasion of plants. In Europe, Lithuania in special, *Impatiens parviflora*, a fully naturalized and frequent invader in various habitats, which most commonly occurs in the vicinity of settlements and roads as well as in slightly disturbed forest. The objective of our study was aimed at evaluation of genetic diversity of populations of *I. parviflora* applying dominant multilocus DNA markers. Twenty one populations were examined using four primers. For the separate markers polymorphic information content (PIC) was very similar (0.201–0.225). ISSR primers have generated from 5 up to 13 DNA fragments per population. Low polymorphism of *I. parviflora* was observed at ISSR loci (16.5 %). Principal coordinate analyses of ISSR data showed that in most cases populations of *I. parviflora* of South-East Lithuania could be separated from populations of North-West part of the country. Hierarchical AMOVA analysis of ISSR data confirmed significance of geographical grouping: 5.6 % of molecular variance was related to differences between 3 geographic parts of Lithuania and molecular diversity among populations was much higher (71.0 %) than intrapopulation diversity (23.4 %). Such our findings correspond to the subdivision of Lithuania into Seaside, Samogitian, Middle Lowlands and South-Eastern Highlands. Such climatic zones of Lithuania were defined by set of climatic parameters such as annual precipitation per year, period with snow cover, duration of sunshine, and number of temperature parameters. To get deeper insights in perspective there is need to relate genetic features of populations with abiotic and biotic environment.

Key words: alien plants, small balsam, *Balsaminaceae*, molecular markers, river basins

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**POTENTIAL OF IMIDAZOLINONE (IMI) RESISTANT
CHICKPEA CULTIVARS TO CONTROL INVASIVE WEED
SPECIES**

Doğan İŞİK¹, Ender Şahin ÇOLAK¹, Mehmet ARSLAN¹

¹Erciyes University, Faculty of Agriculture, Turkey

Invasive weed species are a great threat to chickpea (*Cicer arietinum* L.) and lentil (*Lens culinaris* Medic.) cultivation due to their effective reproductive and dispersal mechanisms. Weed control measures are not often practiced by chickpea growers. Therefore, chickpea cultivation areas are very suitable for reproduction and dispersal of aggressive and competitor invasive weed species. Imidazolinone (IMI) resistant chickpea cultivars offer an alternative and an effective way to control of dominating invasive weed species in the chickpea fields. IMI herbicides, which include imazapyr, imazapic, imazethapyr, imazamox, imazamethabenz and imazaquin, successfully control a broad spectrum of grass and broadleaf weeds as well as weeds that are closely related to the crop by inhibiting the acetolactate synthase (ALS) enzyme. Post emergence application of an IMI herbicide in resistant/tolerant chickpea cultivars can successfully expand limited options for invasive weed control practices in chickpea fields.

Key words: Chickpea, *Cicer arietinum*, Invasive weed, IMI herbicide

Acknowledgements: The authors express their sincere thanks to Turkish Scientific and Technological Research Council (TÜBİTAK) for financial support provided to present study (with the Project number of 218 O 211).

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

INVASIVE PLANT SPECIES AND THE TRANS-SIBERIAN RAILWAY – BACK AND FORTH

Maria GALKINA¹, Yulia VINOGRADOVA¹, Jan PERGL², Valery TOKHTAR³, Viktoria
ZELENKOVA³, Andrey KURSKOY³, Mikhail TRETYAKOV³

¹N.V. Tsitsin Main Botanical Garden of Russian Academy of Sciences, Russia

²Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic

³Belgorod State National Research University, Russia

Railways are the ideal habitats for invasive alien species. Frequent disturbances create suitable open patches, destroy native plants, and propagules along the railroad can easily transport for many kilometers. This study is based on the inventory of current flora of Trans-Siberian railway track (Transsib) done in 2020-2021 (planned to continue also in next year). Up to day, European (Moscow–Vladimir–Nizhny Novgorod–Kirov and Moscow–Yaroslavl–Kostroma–Kirov), Siberian (Taishet–Irkutsk–Ulan-Ude) and Far Eastern (Khabarovsk–Dalnerechensk–Ussuriisk–Vladivostok) sections were covered. In European sections of Transsib we found 265 plant species. Invasive species form 11%, 17 of them are included in TOP 100 of the most dangerous invasive species of Russia. At Siberian section of Transsib only 4 species from total of 266 species are in Top-100 of the most aggressive invasive species. In the Far East section, the numbers are 11 out of 210 species. The four invasive species that are found along the whole Transsib from Moscow to Vladivostok, are *Acer negundo*, *Amaranthus retroflexus*, *Erigeron canadensis*, and *Hordeum jubatum*. Our results confirm that the railway serves also as a recipient of alien species: many found species were initially introduced to cities and villages, such as *Heracleum sosnowskyi*, *Erigeron annuus*, or even continuously to be used in landscaping species, e.g. species of the genus *Solidago*. On the other hand, the railway is the main vector of spreading of alien species, e.g. for *Acer negundo*, *Epilobium adenocaulon*, *Erigeron canadensis*. Active dispersal of Asian *Artemisia sieversiana* along railways in the European part of Russia confirms the hypothesis about the leading role of the Trans-Siberian railway in unintentional movement of plants from Asia to Europe.

Key words: Trans-Siberian railway, alien species, invasive species

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**FIRST REPORT OF *Amaranthus palmeri* S. Wats. IN COTTON,
MAIZE, AND SORGHUM IN GREECE**

Alexandros TATARIDAS¹, Panagiotis Kanatas², Ilias TRAVLOS¹

¹Laboratory of Agronomy, Department of Crop Science, Agricultural University of Athens, Iera Odos 75,
11855, Athens; a.tataridas@gmail.com; travlos@aua.gr, Greece

²Department of Crop Science, University of Patras, P.D. 407/80, 30200 Mesolonghi, Greece;
pakanatas@gmail.com

Palmer amaranth (*Amaranthus palmeri* S. Wats.) is an invasive plant species that has been recently detected in major field crops in Central and Western Greece. Several biotypes of the weed were detected in cotton, sorghum, maize and abandoned fields in Central and Western Greece in 2020. The weed infestations were recorded both inside the fields and in the margins of the fields, indicating that Palmer amaranth invasion in these areas has been recently occurred and, in some cases, has been already naturalized. A pot experiment was conducted in 2021 to assess the putative resistance of four biotypes to nicosulfuron and 2,4-D by using NDVI, canopy cover, photochemical efficiency, plant height and fresh weight values. All biotypes showed susceptibility to 2,4-D and resistance to nicosulfuron. The introduction of Palmer amaranth in Greece is expected to pose a major threat for the sustainable production in various agricultural areas where spring arable crops are mainly cultivated. Should the dispersal of the weed be limited in the monitored regions and in local scale, it would be less difficult to manage this weed if new invasions occur in new areas. Eradication treatments and integrated weed management strategies are the main tactics that must be adopted by local farmers to avoid the distribution of the weed. Screening for herbicide resistant biotypes should be conducted along with research for non-chemical methods to manage Palmer amaranth in Greece.

Key words: Palmer amaranth, invasion, herbicide resistance, cotton, maize

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

INVASIVE WEEDS ON THE CANAL NETWORK OF VOJVODINA

**Bojan KONSTANTINović¹, Nataša SAMARDŽIĆ¹, Milena POPOV¹, Tijana
STOJANOVIĆ¹**

**¹University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Trg
Dositeja Obradovića 8, 21000, Novi Sad, Serbia**

Regular maintenance and operation of irrigation system is of the highest importance for safety of agricultural production in Autonomous Province of Vojvodina, on over 1.7 million ha. For the purpose of channel network maintenance, one of the most important measures is removal of weedy vegetation that grows and develops on riverbanks, channel banks and channel bed.

Due to neglecting of weed control, at the majority of the hydro system channels the occurrence of woody invasive weed has been recorded. Among these, the most frequent are *Prunus spinosa*, *Robinia pseudoacacia*, *Amorpha fruticosa*, *Sambucus nigra*, *Ailanthus altissima*, *Salix alba*, *Acer campestre*, *Crataegus oxyacanta* and other species from the family *Rosaceae*. Dominant broad-leaved invasive weed on channel banks and sides are the following: *Amaranthus retroflexus*, *Erigeron canadensis*, *Ambrosia artemisiifolia*, *Asclepias syriaca*, *Artemisia vulgaris*, and perennial grass species *Sorghum halepense*. *Ambrosia artemisiifolia* and *Asclepias syriaca* are found in the largest number on the canal network and their number goes up to 20 per m². Their number has significantly increased on the slopes and banks of the canal due to mechanical weed control in recent years.

Key words: invasive weed, canals, *Ambrosia artemisiifolia*, *Asclepias syriaca*

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

TREE OF HEAVEN IN VINEYARDS

Ahmet Tansel SERİM¹, Ahmet ULUDAĞ²

¹ Bilecik Seyh Edebali University Agricultural Faculty Department of Plant Protection, Bilecik, Turkey

² Çanakkale Onsekizmart University Agricultural Faculty Department of Plant Protection, Çanakkale, Turkey

Tree of heaven is one of the dangerous invasive alien plant species commonly found in sunny non-agricultural fields, then spread to the agricultural fields via its seeds and root sprouts. The plant has produced a strong allelopathic substrate called as aianthone inhibits the germination of other seed of the weeds, and has reduced their competitive ability. Although most growers have known the impacts of this plant on their crops, the control protocols of the plant have not been well-known by them. Therefore, the fields infested by tree of heaven is getting wider and wider in Turkey. The study has been conducted to determine invasiveness status of the tree of heaven in grape field of Asagikoy Agricultural Application and Research Center (AARC), Bilecik Seyh Edebali University, Turkey. Tree of heaven was firstly found the borders of vineyards and other fields of Asagikoy AARC more than twenty years ago, and ignored by workers. The vineyards which reached the last of their economic life were heavily infested by trees of heaven in time because they were abandoned. The vineyards where cultural requirements were carried out regularly, were slightly infested by the tree, but the abundance of the tree in heavily infested vineyards varied 7-19 sprouts of the tree of heaven per square meter. These sprouts covered all vineyard plants and rows between the plants, and prevented removing vineyards plants with conventional agricultural machinery. Launching an eradication study is considered as a required precaution to control the tree in infested fields of Asagikoy AARC.

Key words: Tree of heaven, *Ailanthus altissima*, allelopathy, vineyard

This page is left blank intentionally

POSTER PRESENTATIONS

This page is left blank intentionally

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

ALTITUDINAL EFFECTS ON PLANT INVASIONS IN RIPARIAN AREAS OF SERBIA

Ana ANĐELKOVIĆ¹, Danijela PAVLOVIĆ¹, Dragana MARISAVLJEVIĆ¹, Milica ŽIVKOVIĆ^{2,3}, Sladana POPOVIĆ⁴, Dužanka CVIJANOVIĆ², Snežana RADULOVIĆ^{2,5}

1 Institute for Plant Protection and Environment, Department of Weed Research, Belgrade, Serbia; email: ana.andjelkovic21@gmail.com

2 University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, N. Sad, Serbia

3 Educons University, Faculty of Environmental Protection, Sremska Kamenica, Serbia

4 University of Belgrade, Institute of Chemistry, Technology and Metallurgy, National Institute of the Republic of Serbia, Center of Ecology and Technoeconomics, Belgrade, Serbia

5 University of Sarajevo, Faculty of Science, Sarajevo, Bosnia & Herzegovina

Riparian areas are known to be subjected to strong invasion pressures of alien plants, consequently representing critical points of their further spread. The overall tendency of invasive alien plants (IAPs) to favor lowland riparian sites has been shown for various European regions. Therefore, we aimed to test if the presence and abundance of IAPs in the riparian areas of Serbia had the same response to altitudinal effects. A total of 250 riparian field sites, distributed across nine catchment areas and the Danube-Tisa-Danube canal network, were studied during the 2013-2016 period. Multivariate analysis was conducted using the database consisting of 26 recorded IAPs, later grouped, based on their origin and life form. These groups and individual IAPs abundances were analyzed in relation to altitude. Redundancy analysis (RDA) has shown altitude to be a significant predictor of the abundance of individual IAPs ($F=7.1$, $p=0.002$). Additionally, response to altitude of selected IAPs depending on their origin was also significant (RDA; $F=2.4$, $p=0.024$). While all groups dominate at lower altitudes (< 200 m), some (e.g. South American and tropical IAPs) were solely recorded in these low-lying areas. On the other hand, North American species show the highest association with riparian zones found between 500 and 800 m. Similarly, the effect of altitude was also a significant predictor of the presence of groups of IAPs, depending on their life-form (RDA; $F=5.0$, $p=0.002$). While all groups dominate in lowland riparian areas (<200 m), geophytes and hemicryptophytes are more abundant at altitudes between 200 and 500 m, and phanerophytes are present more than others in mountain riparian sites (500-800 m a.s.l.).

Key words: alien invasive plants, altitude, plant invasions, riparian zone, Serbia

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**EFFICACY OF DIFFERENT GLYPHOSATE FORMULATIONS
AGAINST THE INVASIVE WEED *Solanum elaeagnifolium* Cav.**

Alexandros TATARIDAS¹, Aikaterini ZERVOPOULOU¹, Ilias TRAVLOS¹

**¹Laboratory of Agronomy, Department of Crop Science, Agricultural University of Athens, Iera Odos 75,
11855, Athens; a.tataridas@gmail.com; travlos@aua.gr Greece**

Silverleaf nightshade (*Solanum elaeagnifolium* Cav.) is an invasive noxious weed that propagates mainly vegetatively through rhizomes. The extended network of rhizomes poses a major constraint for the effective management of this weed. Tillage is considered inefficient due to root fragmentation and dispersal, and systemic herbicides do not provide adequate control in the long-term. Glyphosate is one of the few remaining systemic herbicides that control silverleaf nightshade. However, the different glyphosate formulations that are available result in variant control of the weed depending on the growth stage when these are applied. A field experiment was conducted in 2020 in the Laboratory of Agronomy at the Agricultural University of Athens to evaluate the efficacy of five different glyphosate formulations against three growth stages of silverleaf nightshade (early vegetative, anthesis, berries), which formed uniform stands of 80-120 plants/m². The treatments included two potassium salts, one isopropylamine salt, one isopropylamine salt+2,4-D, and one isopropylamine salt+ammonium salt. Within-season control was measured 28 days after treatment in terms of reduction of stems and biomass per m² compared to unsprayed control. The control varied between 92-97% after the application in early vegetative growth stages, 37-91% at anthesis, and 77-100% at the berries stage, across all formulations. Potassium salts resulted in the lowest control at anthesis, while isopropylamine salts showed the highest efficacy. The highest reduction of weed biomass was recorded with isopropylamine formulations at anthesis (40.6-53.0%), compared to control. At berries stage, the formulation had statistically significant effect on the biomass reduction ranged between 36.2-52.6%.

Key words: silverleaf nightshade, glyphosate, potassium salt, isopropylamine salt, ammonium salt

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

GENETIC DIVERSITY OF POPULATIONS OF *Phalaris arundinacea*: CASE STUDY NEAR THE BALTIC SEA

Edvina KROKAITĖ¹, Lina JOCIENĖ¹, Tomas REKAŠIUS^{1,2}, Algimantas PAULAUSKAS¹, Eugenija KUPČINSKIENĖ¹

¹Vytautas Magnus University, Kaunas, Lithuania

²Gediminas Technical University, Vilnius, Lithuania

Riparian plant species play a key role in aquatic ecosystems, and data on their status, habitats, spatial and temporal changes are of particular importance. Big threat to water ecosystems is caused by invasive plant species. *Phalaris arundinacea* is common species of the wetlands, growing naturally within Eurasia, although invasive for some habitats of N. America. Lots of investigations have been done along invasive distribution range of *P. arundinacea*, although information about vitality of the species within natural distribution range is not satisfactory. The task of the present study was to evaluate the genetic diversity of Lithuanian populations of *P. arundinacea* using 14 microsatellite markers. The average polymorphism among the studied population was 29.5%. The genetic distances between Lithuanian populations of *P. arundinacea* ranged from 0.041 to 0.224. Statistically significant differentiation of populations between the Nemunas and Coastal rivers or the Lielupė, Venta, Bartuva river basins was documented. Very small, but statistically significant genetic differentiation among the population groups according to different land cover classes, former nitrogen pollution of the rivers, present state of the rivers, was documented. The knowledge on the genetic diversity of *P. arundinacea* in N. America, Western and Central Europe is supplemented by our study in the data of populations in the Eastern Baltic region. The data on the genetic diversity of Lithuanian populations could be applied in the future selection process to develop new productive varieties which might be used as fodder or raw material for biofuel production.

Key words: reed canary grass, alien plants, macrophytes, molecular markers, aquatic ecosystems

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

**GENETIC PARAMETERS OF POPULATIONS OF
Lythrum salicaria GROWING WITHIN SOME AREAS OF
NATURAL DISTRIBUTION RANGE**

**Eugenija KUPČINSKIENĖ¹, Lina JOCIENĖ¹, Tomas REKAŠIUS^{1,2}, Dinara
SHAKENEVA¹, Edvina KROKAITĖ¹**

¹Vytautas Magnus University, Kaunas, Lithuania

²Gediminas Technical University, Vilnius, Lithuania

Riparian habitats are very complex and important part of terrestrial ecosystem. When compared to land plants, riparian vegetation is exposed to a much stronger effect of anthropogenic factors. Under various scenarios of ongoing climatic change, information about diversity of plants, sampled within natural distribution range, is crucial for understanding of species behavior potentials. In special, information about genetic traits might be valuable tool explaining possible mechanisms of invasiveness success. *Lythrum salicaria* is a species of the Northern Hemisphere. It is widely investigated along his invasive distribution range in North America, and natural areas of West Europe. Information about the species in more northern-eastern territories of Europe, including Baltic States, is still missing; despite *L. salicaria* is rather common plant of wetlands of these areas. The present study is aimed at evaluation of genetic diversity of Lithuanian populations of *L. salicaria*. Growing along three river basins (Nemunas, Seaside rivers and Lielupė), 15 populations were examined. For molecular studies, four pairs of amplified fragment length polymorphism (AFLP) markers have been used. Genetic diversity parameters (mean per population) were as followed: percentage of polymorphic loci (% P) was 57.2, expected heterozygosity (H_e) was 0.183, and Shannon's information index (I) was 0.280, and polymorphic information content 0.218. Mantel test showed that there was correlation between genetic distance between populations and geographical distribution. Despite present examination of *L. salicaria* populations in much smaller spatial scale, indices of genetic diversity of Lithuanian populations were comparable with those obtained for populations of the wide continental transects.

Key words: purple loosestrife, AFLP, invasive plants, riparian vegetation, molecular markers

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

NUTRITION PECULIARITIES OF POPULATIONS OF *Phalaris arundinacea* IN RELATION TO BIOTIC AND ABIOTIC FACTORS OF ENVIRONMENT

**Eugenija KUPČINSKIENĖ¹, Lina JOCIENĖ¹, Tomas REKAŠIUS^{1,2},
Edvina KROKAITĖ¹**

¹ Vytautas Magnus University, Kaunas, Lithuania

²Gediminas Technical University, Vilnius, Lithuania

Sustainable development of agriculture requires the preservation and ecological balance in the use of natural resources. All soil and climate changes are significant for the condition of groundwater and water bodies. In the temperate climate zone, one of the most common species of macrophytes is the reed canary grass (*Phalaris arundinacea* L.). It grows naturally and is widespread in Lithuania. In order to use this plant for the forage, as well as for ornamental purposes, phytoremediation, biofuel production. Sixty one Lithuanian populations of *P. arundinacea* were sampled and dried leaves were analyzed by Kjeldahl method. Multiple correspondence analysis between groups of populations of different plant species, formed depending on certain factors, was done by *FactoMineR* and *FactoExtra*. The leaf nitrogen concentration of Lithuanian populations of *P. arundinacea* ranged from 3.03 to 3.69% dry mass and had lower concentrations of nitrogen than *Phragmites australis*, *Echinocystis lobata*, *Bidens frondosa*, *Nuphar lutea*, but higher than *Lythrum salicaria* and *Stuckenia pectinata*. According to the Benjamini-Hochberg correction, significant differences were found between *Phalaris arundinacea* and all other macrophyte species, except *Bidens frondosa*. No significant differences in leaf nitrogen concentration were observed between population groups according to former nitrogen pollution by agriculture, land cover and use classes, river status, river size, origin of riverbed. The absence of population differences in N concentrations of *P. arundinacea* leaves might be caused by the recent transition of Lithuanian agriculture from intensive farming to ecological, and the improvement of wastewater treatment systems in settlements and cities.

Key words: reed canary grass, alien plants, nitrogen concentration, aquatic ecosystems, wetlands

The Invasive Plants Working Group of the EWRS workshop

“Our path after Covid-19”

September 23-24, 2021

In Palić, Serbia

ENVIRONMENTAL FACTORS DETERMINING THE SHOOT DENSITY OF *Ambrosia psilostachya*, AN INVASIVE ALIEN PERENNIAL SPECIES IN NORTHERN IRAN

Sara ALMASI¹, Mostafa OVEISI¹, Somayeh TOKASI²,
Heinz MÜLLER-SCHÄRER^{1,3}

¹ Department of Agronomy and Plant Breeding, Faculty of Agriculture and Natural Resources, University of Tehran, Karaj, Iran.

² Department of Crop Protection, Agricultural Research, Education and Extension organization, Guilan, Iran.

³ Department of Biology, University of Fribourg, Fribourg, Switzerland.
Corresponding email: moveisi@ut.ac.ir / Presentation type: Poster

Ambrosia psilostachya is an alien species that has become widespread in the western seashore of the Caspian Sea. There are severe concerns about its allergenic pollens that can impose high medical treatment costs. To investigate its environment-related occurrence, we collected information from 80 location points, 60% with the presence of *A. psilostachya*. We recorded the occurrence or absence of *A. psilostachya*, its shoot numbers where present, longitude and latitude, soil texture and moisture, soil nitrogen, and the density of the co-occurring plant species. Based on results, the shoot number was significantly higher in sand-clay soils than in sandy soils. Dry soils had higher shoot numbers than wet soils, and *A. psilostachya* did not occur in moist soils. Neighboring plants were mostly *Lolium perenne*, *Cynodon dactylon*, *Poa annua*, and *Cyperus rotundus*. The increasing number of plant species was negatively correlated with the *A. psilostachya* shoot density. In plots with a high density of *L. perenne* or *Cynodon dactylon*, *A. psilostachya* was absent or with low densities, also in soils with high nitrogen content. Therefore, in rice fields which is the main crop in the area, the high moisture and nitrogen contents of soils are not suitable for *A. psilostachya*. Therefore, the threat of being a new competitor in crops is not likely, however, the risk of spread along road sides, in human residence areas, and non-disturbed grounds is still high. A management program is, thus, highly recommended to prevent its further spread and harmful health impact due to its allergenic pollen.

Keywords: *Ambrosia psilostachya*, Invasive plants, Allergenic impact, Medical cost.

PALIĆ REPORT

Uludağ, A., Konstantinović, B., Müller-Schärer, H., Bohren, C., Vrbničanin, S., Anđelković, A., Arslan, M., Božić, D., Galkina, M., Işık, D., Jovanović, D., Krokaitė, E., Kupčinskienė, E., Lazarević, J., Nedeljković, M., Oveisi, M., Popov, M., Rajković, M., Samardžić, N., Stojanović, T., Tataridas, A., Tojić, T.

EWRS invasive plants (IP) working group (WG) had a workshop held in Palić, Serbia and discussed future WG activities.

The Workshop attendees, appreciated EWRS, local organizers and supporters of the Workshop, as well as the hospitality of the Serbian people;

Underlined issues on the agriculture and environment definitely keep their importance and the Covid-19 showed it one more time to the entire planet;

Stressed importance of the alien plants for the food stability to meet the needs of the increasing world population and for the possible positive role under the global change to support the sustainability;

Underlined the role of the alien plants, in case they are invasive, in losing biodiversity, affecting sustainability of ecosystem services and creating problems on public health;

Noted that explaining the invasive alien plants (IAP) hazards to the general public and policy makers is difficult because of the misunderstanding of the environmental protection and some immediate benefits that the given species provide although they are IAP;

Repeated that no bad plants exist in the world; a weed is in the perspective of some human's project simply a plant growing in the wrong place. Therefore, the weeding is indispensable in the agricultural environment;

Implied that in the industrialized and technology-based societies the proportion of the people working in agriculture has become exceptionally small. Therefore, the agronomists are rare within the political decision makers or media workers. This helps creating a general atmosphere of misunderstandings because the knowledge of the technical details gets easily lost in the political discussions, as well as in the discussions with the specialists from other (also non-scientific) domain;

Recalled that a part of the industrial agriculture using herbicides rapidly losing sympathy for the political discussions is increasing. The weed science per se and therefore the EWRS do not have stakeholders in the extended network throughout the society. On the contrary, the life sciences use attractive catchwords: "Biodiversity" and "Global warming", which are successfully used as a crowd-puller or a driving force for financing scientific work; they run a strong lobby;

Noted that the side effects of the agriculture such as polluting the environment and herbicide resistant crops and weeds make our efforts not to reach the expected understanding of the general public on weeds and invasive plants;

Regretted the contribution from agriculture on climate change, environmental pollution, forgetting sustainability, and following profit-oriented path;

Remembered that EWRS IP WG organized successful meetings to exchange the information and make the others, as well as the other scientific groups, aware of what we have done so far;

Recommended that researches on biological control, genetics, epigenetics, unmanned vehicles, artificial intelligence, citizen science, ethics and economics in the context of the invasive plants should be prioritized;

Understood that the WG – actually a loose group of specialists meeting here and there irregularly and in changing compositions – need to consolidate itself, to form sustainable forces for offering adapted information to the concerned people;

Underlined that the WG needs to do workshops and trainings on the specific IP subjects for the scientists, while training and educating the farmers and all the stakeholders are considered necessary;

Noted that field trainings for young scientists, practitioners and even farmers can be planned;

Urged that farmers, rangers, and other persons concerned with the invasive plants need advice for the management and exchange of experience;

Urged use of social media actively to create awareness including short movies on the attractive subjects such as the cases of successful management of IP;

Noted that some flagged species should be selected, such as *Abutilon theophrasti*, *Amarantus* spp, *Bidens frondosa*, *Echinochloa* spp, *Erigeron* spp, *Xanthium* spp, that should be covered by the common work of the group;

Underlined the usefulness of common experiments that can be planned to solve our common problems and to establish a theoretical base of the interrelationship of the invasive alien plants and weeds;

Urged to prepare an opinion paper including definitions, the role of weed scientists and the WG;

Expected that the EWRS and IP WG particularly will follow the decisions and ideas of the attendees;

Decided to do the best altogether to keep the planet healthy for the future generations as keeping the idea of one health and the ideas compiled together.

LIST of ATTENDEES

Full name	Affiliation	Country	e-mail
Andelković Ana	Institute for Plant Protection and Environment, Department of Weed Research, Belgrade	Serbia	ana.andjelkovic@gmail.com
Arslan Mehmet	Erciyes University, Faculty of Agriculture	Turkey	mehmetarslan@erciyes.edu.tr
Bohren Christian	Former Chair of EWRS IP VG	Switzerland	christian.bohren@bluewin.ch
Božić Dragana	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	dbozic@agrif.bg.ac.rs
Galkina Maria	N.V. Tsitsin Main Botanical Garden of Russian Academy of FisikSciences	Russia	mawa.galkina@gmail.com
Işık Doğan	Erciyes University, Faculty of Agriculture	Turkey	dogani@erciyes.edu.tr
Jovanović Darko	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	darkocovdinac@gmail.com
Konstantinović Bojan	University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Novi Sad	Serbia	bojank@polj.uns.ac.rs
Krokaitė Edvina	Vytautas Magnus University, Kaunas	Lithuania	edvina.krokaite@gmail.com
Kupčinskienė Eugenija	Vytautas Magnus University, Kaunas	Lithuania	e.kupcinskiene@gmail.com
Lazarević Jovan	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	dzozef.lazarevic95@gmail.com
Müller-Schärer Heinz	University of Fribourg, Department of Biology	Switzerland	heinz.mueller@unifr.ch
Nedeljković Marija	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	marija.nedeljkovic00@gmail.com
Oveisi Mostafa	University of Tehran, Faculty of Agriculture and Natural Resources, Department of Agronomy and Plant Breeding, Karaj	Iran	moveisi@ut.ac.ir
Popov Milena	University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Novi Sad	Serbia	milena.popov@polj.uns.ac.rs
Rajković Miloš	Institute of Field and Vegetable Crops, Novi Sad	Serbia	rajkovicmilos@gmail.com
Samardžić Nataša	University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Novi Sad	Serbia	natasa.samardzic@polj.uns.ac.rs
Stojanović Tijana	University of Novi Sad, Faculty of Agriculture, Department of Plant and Environmental Protection, Novi Sad	Serbia	tijana.stojanovic@polj.edu.rs
Tataridas Alexandros	Laboratory of Agronomy, Department of Crop Science, Agricultural University of Athens	Greece	a.tataridas@gmail.com
Tojić Teodora	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	tojicteodora@gmail.com
Uludağ Ahmet	Çanakkale Onsekizmart University Agricultural Faculty Department of Plant Protection, Çanakkale	Turkey	ahuludag@yahoo.com
Vrbničanin Sava	University of Belgrade, Faculty of Agriculture, Zemun	Serbia	sava@agrif.bg.ac.rs

This page is left blank intentionally















Palić, Serbia

**WG Workshop
"Our path after Covid-19"**

2021

