European Environment Agency

Book of abstracts

2nd International Workshop on Invasive Plants in the Mediterranean Type Regions of the World

2010-08-02/06, Trabzon, Turkey

Document prepared by the EPPO Secretariat.

Content

Steering Committee of the Workshop

The steering committee is so far composed of experts from Mediterranean regions of the world:

Local Committee
Mr Güven Algün, Trabzon Agricultural Quarantine Directorate
Mr Osman Nuri Baki, Province Directorate of Ministry of Agriculture and Rural Affairs
Mr Doğan Işik, Karadeniz Agricultural Research Institute, Samsun
Prof Atalay Sökmen, Karadeniz Technical University, Trabzon
Mr Süleyman Türkseven, Ege University, Izmir
Mr Ahmet Uludag, European Environment Agency
Prof Huseyin Zengin, Igdir University, Igdir

International Committee
Mr Ahmet Aslan, Ministry of Agriculture and Rural Affairs, Turkey
Mr Anoir Al Mouemar, University of Damas, Syria
Mr Christian Bohren, Agroscope Changins, Switzerland
Mr François Boillot, Conservatoire Botanique National Méditerranéen de Porquerolles, France
Mr Giuseppe Brundu, Sardinian Forest Corps (CFVA), Italy
Prof Ramiro Bustamante, University of Chile, Chile
Ms Sarah Brunel, OEPP/EPPO
Ms Laura Celesti-Grapow, University "La Sapienza di Roma", Italy
Ms Costanza dal Cin D'Agata, Park for the Preservation of Flora and Fauna, Greece
Mr Joe DiTomaso, University of California, Davis, California
Mr Pierre Ehret, French National Plant Protection Organization, France
Mr Eladio Fernandez-Galiano, Council of Europe
Mr Guillaume Fried, French National Plant Protection Organization, France
Mr Piero Genovesi, ISSG
Prof. Vernon Heywood, University of Reading, United Kingdom
Mr Geoffrey Howard, IUCN
Prof Inderjit, CEMDE, University of Delhi, India
Ms Elizabete Marchante, University of Coimbra, Portugal
Ms Lindsey Norgrove, CABI
Prof Baruch Rubin, The Hebrew University of Jerusalem, Israel
Prof Abdelkader Taleb, Institut Agronomique et Vétérinaire Hassan II, Morocco
Prof David M. Richardson, University of Stellenbosch, South Africa
Mr Andy Sheppard, CSIRO Entomology, Australia
Ms Sarah Simons, Global Invasive Species Programme
Ms Salma Talhouk, The American University of Beirut, Lebanon
Ms Anna Traveset, Spanish Research Council (CSIC), Spain
Mr Tuvia Yaacoby, Plant Protection and Inspection Services, Israel
Prof Sinasi Yildirimli, Hacettepe University, Turkey

Programme of the 2nd International Workshop

Invasive Plants in the Mediterranean Type Regions of the World

2010-08-02/06, Trabzon, Turkey

Monday 2nd of August

8:30: Registration

10:00: Opening Ceremony

Opening speeches

11:00-11:30: Flora of Turkey: Richness, updates, threats, *Mr Necmi Aksoy, Turkey*

11:30-12:00: Impacts of global change on plant life in the Mediterranean region and the spread of invasive species, *Prof. Vernon Heywood, UK*

***12:00-2:00**: Lunch*

2:00-2:30: New mechanisms invasive alien plants might employ for their success, *Prof. Inderjit, India*

2:30-3:00: Invasive Weeds threats and strategies in Gangetic inceptisols of India, *Prof. Ratikanta Ghosh, India*

3:00-3:30: Niche modeling in invasive plants: new insights to predict their potential distribution in the invaded areas, *Prof. Ramiro Bustamente, Chile*

***3:30-4:00**: Coffee break*

4:00-4:20: Bern Convention on invasive alien plants, the Code of conduct on horticulture and invasive alien plants, *Mr Eladio Fernandez-Galiano, Council of Europe*

4:20-4:40: EPPO activities on Invasive Alien Plants, *Ms Sarah Brunel, EPPO*

4:40-4:50: Role of the European Food Safety Authority in risk assessment of invasive species potentially harmful to plants, *Ms Sara Tramontini, EFSA*

4:50-5:20: Towards an early warning and information system for invasive alien species (IAS) threatening biodiversity in Europe, *Mr Riccardo Scalera, IUCN*

5:20-5:40: European Environment Agency: Activities addressing invasive alien species, *Mr Ahmet Uludag, EEA*

5:40-6:00: Results of the survey on invasive alien plants in Mediterranean countries, *Mr Giuseppe Brundu, Italy, Mr Guillaume Fried, France, Ms Sarah Brunel, EPPO.*

Tuesday 3rd of August

Section 1 : Plant invasions in the Mediterranean: where do we stand?
Chair: *Prof Vernon Heywood*

8:30-8:50: One fall all or all for one? Evidence for cryptic invasions by multiple sub-species of the Port Jackson Willow (*Acacia saligna*), *Ms Geneviève Thompson, South Africa*

8:50-9:10: Prioritization of potential invasive alien species in France, *Mr Guillaume Fried, France*

9:10-9:30: Forecast of further distribution of some invasive and expansive plant species in Armenia, *Mr George Fayvush, Armenia*

9:30-9:50: Noxious and invasive weeds in Greece: current status and legislation, *Mr Petros Lolas, Greece*

9:50-10:10 A tales of two islands: comparison between the exotic flora of Corsica and Sardinia, *Mr Daniel Jeanmonod, Switzerland,* and *Mr Giuseppe Brundu, Italy*

10:10-10:30: New species threatening Moroccan biodiversity: *Verbesena encelioides* (*Asteraceae*), *Prof Abdelkader Taleb, Morocco*

***10:30-11:00**: Posters and coffee break*

11:00-12:30: Small Workshops

- Using the prioritization process for Mediterranean countries, *Chaired by Mr Guillaume Fried and Ms Sarah Brunel*

- Alien trees in the Mediterranean countries: focussing on *Acacia* spp., *Chaired by Ms Genevieve Thomson and Mr Giuseppe Brundu*

- Similarities and differences between distribution of invasive alien plants in the Black Sea and Mediterranean area, *Chaired by Mr Necmi Aksoy*

***12:30-2:00**: Lunch*

Section 2 : Early warning
Chair : *Mr Ahmet Uludag*

2:00-2:20: Stages in the Development of an Early Detection and Rapid Response (EDRR) Program for Invasive Plants, *Mr Kassim Al-Khatib, USA*

2:20-2:40: Establishment of a National early detection and rapid response programme - some early lessons, *Mr Philip Ivey and Ms Hilary Geber, South Africa*

2:40-3:00: The NOBANIS gateway on invasive alien species and the development of a European Early Warning and Rapid Response System, *Ms Melanie Josefsson, NOBANIS*

3:00-3:20: From mediocrity to notoriety - the case of invasive weedy rice (*Oryza sativa* L.) in Malaysian rice granaries, *Mr Baki Bakar, Malaysia*

3:20-3:40: Eradication and monitoring of Australian Acacias in South Africa as part of an EDRR program, can species with long-lived seed banks be eradicated? *Mr John Wilson, South Africa*

3:40-4:00: Should Melaleuca be an eradication target in South African fynbos? Looking beyond population data, *Mr Ernita Van Wyck, South Africa*

***4:00-4:30**: Posters and coffee break*

4:30-6:00: Small Workshops

- Building an Early Detection Rapid Response (EDRR) for the Mediterranean, *Chaired by Mr Kassim Al-Khatib and Mr Ahmet Uludag*

- Identifying targets for eradication in the Mediterranean and eradication experiences, *Chaired by Mr Eladio Fernandez Galiano*

- Cooperation/inclusion of North African Countries in European early warning system, *Chaired by Mr Mohamed Bouhache* and *Mr Riccardo Scalera*

6:00-6:30: Preparatory workshop for the field trips (presentation of the itinerary, descriptions of aims and tasks).

Wednesday 4th of August

Section 3: Communication, policies & strategies for tackling invasive alien plants
Chair: *Prof. Ramiro Bustamente*

8:30-8:50: Code of conduct on horticulture and invasive alien plants, *Prof. Vernon Heywood, UK*

8:50-9:10: Industry view on importance and advantages of a Code of Conduct on horticulture and invasive alien plants, *Mr Anil Yilmaz, Turkey*

9:10-9:30: Effectiveness of policies and strategies in tackling the impacts on Invasive Alien Species on biodiverse Mediterranean ecosystems in southwest Australia, *Ms Judy Fisher, Australia*

9:30-9:50: Combining methodologies to increase public awareness about invasive plants in Portugal, *Ms Elisabete Marchante, Portugal*

9:50-10:10: Outcomes of the Tunisian experience on farmer field school management of Silverleaf nightshade, *Mr Mounir Mekki, Tunisia*

10:10-10:20: Legislative, biological and agronomic measures to comply with the Bern Convention recommendation n141/2009 on "Potentially invasive alien plants being used as biofuel crops" by Contracting Parties in the Mediterranean Basin, *Mr Roberto Crosti, Italy*

10:20-10:30: Biomass crops in the Mediterranean: can experiments in Languedoc Roussillon help characterize the risk of invasiveness of the plants used? *Mr Pierre Ehret, France*

***10:30-11:00**: Posters and coffee break*

11:00-12:30: Small Workshops

- Implementing Codes of conduct on horticulture and invasive alien plants for the Mediterranean, *Chaired by Prof. Vernon Heywood*

- How to communicate on invasive alien plants? Effective involvement of stakeholders in addressing IAPs, *Chaired by Ms Elisabete Marchante*

- Biofuel crops in the Mediterranean: exploring the use of risk species, *Chaired by Mr Pierre Ehret and Mr Roberto Crosti*

12:30-13:00: *Lunch*

Field Trip, *coordinated by Mr Necmi Acksoy, Prof Atalay Sökmen and Mr Giuseppe Brundu*
The field trips will aim not only at discovering the nature and culture of the Black Sea region, but also to make inventories of the alien flora so as to contribute to the botanical knowledge of the area.

13:00: Departure for Uzungol

13:00-13:30: Along the motorway, we will see the native old *Pinus sylvestris* forest situated at the sea level in Sürmene – Çamburnu. This forest has been designated as Natural Park by the Forest district.

14:00-14:45: The second excursion will be done in the area of the Tea Factories of Of, where many weeds could be observed. Participants will have some time to make photos and collect weed/alien samples.

15:30-19:00: Visit and herborization in the Uzungöl protected forest area which includes many different woody and herbaceous plants. Participants will have some time to make photos and collect weed/alien samples.

19:00-20:00: Return to the Hotel.

Thursday 5 August

Field Trip, *coordinated by Mr Necmi Acksoy, Prof Atalay Sökmen and Mr Giuseppe Brundu*

08:30: Departure from the Hotel

09:00-10:30: Visit of the Herbarium and Arboretum of the Karadeniz Technical University (Faculty of Forestry) and of the natural and exotic woody and herbaceous plants on the campus. Participants will have some time to make photos and collect weed/alien samples.

10:30-11:00: Departure for Altındere Valley, Maçka

11:00-11:30: Visit of the Esiroglu or Macka plantation area where soil erosion control is undertaken.

11:30-13:30: Departure for the Sümela Monastery

13:30-18:00: Lunch in the Sumela Monastery and visit of the *Picea orientalis* forest. Participants will have some time to make photos and collect weed/alien samples.

18:00-18:30: Return to the Hotel

Friday 6th of August

Section 4 : Management of invasive alien plants
Chair: *Mr Giuseppe Brundu*

8:30-8:50: Management of alien plant invasions: the role of restoration - Insights from South Africa, *Ms Mirijam Gaertner & Mr Dave M Richardson, South Africa*

8:50-9:10: A large-scale project of invasive plant coenosis control in Mediterranean sand coastal area: two case studies and a model to standardize the management criteria, *Mr Antonio Perfetti, Italy*

9:10-9:30: Three tools to manage exotic weeds in Swiss agricultural and non agricultural environments - a proposal, *Mr Christian Bohren, Switzerland*

9:30-9:50: Biology and control of the invasive weed *Heterotheca subaxillaris* (camphorweed), *Ms Mildred Quaye, Israel*

9:50-10:10: Mesquite (*Prosopis juliflora*): A threat to agriculture and pastoralism in Sudan, *Mr Abdel Gabar T Babiker, Sudan*

10:10-10:30: Is bio control of *Ambrosia* spp. with *Epiblema strenuana* found in Israel possible? *Mr Tuvia Yaacoby, Israel*

***10:30-11:00**: Posters and coffee break*

11:00-12:30: **Small Workshops**

- Field Trip: hands on survey for alien weeds, *Chaired by Mr Giuseppe Brundu and Mr Necmi Aksoy*

- Building a network for the control of *Ambrosia artemisiifolia* in the Mediterranean, *Chaired by Mr Christian Bohren*

- Measures preventing the introduction of invasive plants in arable crops, *Chaired by Ms Garifalia Economou and Mr Ahmet Uludag*

***12:30-2:00**: Lunch*

2:00-3:30: Poster session and Internal work of the workshop chairs

***3:30-4:00**: Coffee break*

Outcomes of the Workshop

4:00-6:30: Outcomes of the small workshops: Recommendation of the Workshop, Selection of the future venue

6:30: Closure of the workshop

Posters

Section 1 : Plant invasions in the Mediterranean: where do we stand?

Inventories of invasive alien plants in Mediterranean countries

Lists of invasive alien plants (IAPs) as a key issue/tool in effective management of invasive non-native species
Mr Pavol Eliáš, Slovakia

Some invasive plants in the Western Black Sea region of Turkey and their monitoring possibilities
Mr Necmi Aksoy, Ayşe Kaplan, Neval Güneş Özkan , Serdar Aslan , Turkey

Alien Plant Species in the Western Part of Turkey: Assessing their Invasiveness Status
Mr Emin Ugurlu, Turkey & Mr Roberto Crosti , Italy

Invasive plants in Armenia (current situation)
Ms Kamilla Tamanyan, Armenia

Invasive aquatic plants in the French Mediterranean area
Ms Emilie Mazaubert & Mr Alain Dutartre, France

The inventory of the alien flora of Crete (Greece)
Ms C Dal Cin D'Agata, Greece, Ms Melpomene Skoula, Greece & Mr Giuseppe Brundu, Italy

Cactaceae naturalized in the Italian Mediterranean region
Mr Alessandro Guiggi & Mr Giuseppe Brundu, Italy

Comparison of the exotic vascular flora in continental islands: Sardinia (Italy) and Balearic Islands (Spain)
Ms Lina Podda, Italy

Is it the analogue nature of species which enables their successful invasion in woodland and coastal ecosystems of the southwest Australian Mediterranean biodiversity hotspot?
Ms Judith L. Fisher & D Merritt, Australia

Inventories of weeds in Mediterranean countries

Alien plants in cotton fields and their impact on Flora in Turkey
Mr İlhan Üremiş, Bekir Bükün, Hüseyin Zengin, Ayşe Yazlik, Ahmet Uludağ, Turkey

Some Invasive Weeds in Turkey: *Diplachnea fusca* (L.) P. Beauv., *Chondrilla juncea* L., *Bromus* spp.
Mr Demirci, M., Ilhan Kaya, H. Aykul, S. Türkseven, Y. Nemli, Turkey

Some Important Invasive Plants Belonging to the *Asteracea* Family in Turkey
Ms Ilhan Kaya, I. Tepe, R. Yergin, Turkey

Some Invasive Obligate Parasitic Plants: *Cuscuta* spp., *Orobanche* spp., *Phelipanche* spp.
Mr Yildiz Nemli, R. Yergin, Ş. Tamer, P. Molai, A. Uludag, Turkey

Some invasive weeds in cereal areas of Northern Cyprus: *Oxalis pes-caprae* L. and *Gladiolus italicus* Mill.
A.Göksu, Y.Nemli, K. Vurana, B.Gökhan, S.Türkseven, M.Demirci, A.Erk, E.Hakel, Cyprus & Turkey

Section 2 : Early warning

Validation and use of the Australian Weed Risk Assessment in Mediterranean Italy
Mr Roberto Crosti, Ms Carmela Cascone & Mr Salvatore Cipollaro, Italy

A proposal for a cooperation program on modeling the spread of invasive weeds
Mr Guillaume Fried, France, Mr Anwar Al Mouemar, Syria & Mr Henry Darmency, France

Impact of *Humulus japonicus* on riparian communities in the south of France
Mr Guillaume Fried, France

Allelopathic effects of *Oxalis pes-caprea* L. on winter cereal crops
Mr Mohammed Bouhache, Prof. Adbelkader Taleb & M. A Gharmmate, Morocco

Fitness of the populations of invasive volunteer sunflower
Ms Sava Vrbnicanin, Ms Dragana Bozic, Ms Danijela Pavlovic & Ms Marija Saric, Serbia

Particular cases of invasive alien plants and weeds

Nicotina glauca Graham: an invasive with harmful potential
Mr Stephen L Jury & Mr JD Ross, UK

Tree of heaven (*Ailanthus altissima* (Mill.) Swingle) – Colonization in Croatia
Mr Veljko Lodeta, Mr Nemad Novak & Mrs Maja Kravarscan, Croatia

Effects of the invasion of *Ambrosia artemisiifolia* in Hungary
Ms Okumu Martha, Hungary

Heracleum sosnovskyi habitats and naturalization in Lithuania
Ms *Ligita Baležentienė, Lithuania*

Distribution of silverleaf nightshade (*S. elaeagnifolium*) in Greece and invasiveness as related to leaf morphological characters
Ms Garifalia Economou, Ms Costas Fasseas, D. Christodoulakis & Ilias S. Travlos, Greece

Germination ecology of the invasive *Acacia saligna* (Labill.) Wendl. (Fabaceae): interpopulation variation and effects of temperature and salinity.
Ms. Lina Podda, Italy

Assessing the potential invasiveness of *Cortaderia selloana* in Sardinian wetlands through seed germination study.
Ms. Lina Podda, Italy

Section 3: Communication, policies & strategies for tackling invasive alien plants

Industry view on importance and advantages of a Code of Conduct on horticulture and invasive alien plants, *Mr Anil Yilmaz, Turkey*

Anigozanthos hybrids: what are the chances of eradicating this flower-farm escapee?
Mr Ivey Philip, South Africa

Use of "native" Cardoon (*Cynara cardunculus*) as a bioenergy crop in the Mediterranean basin: concerns regarding invasive traits of some taxa.
Mr Roberto Crosti, Italy, & Ms Janet A. Leak-Garcia US

Section 4 : Management of invasive alien plants

Management of invasive alien plants in Mediterranean countries

Control experiments on selected invasive alien species in the Bulgarian flora
Mr Vladimir Vladimirov & Ms Senka Milanova, Bulgaria

Management of *Ludwigia peploides* (water primrose) in the Vistre River (South-East of France): first results
Mr Alain Dutartre, Mr C. Pezeril, Ms Emilie Mazaubert, France

A project for the eradication and the control of *Ailanthus altissima* in a river park in Northern Italy
Ms Anna Mazzoleni, Ms Elena Tironi & Mr Eric Spelta, Italy

Solanum eleagnifolium, an increasing problem in Greece.
Prof Eleni Kotoula-Syka, Greece

Plant invasion, soil seed banks and native recruitment in two urban Mediterranean woodland remnants, in southwest Australia
Ms Judith L. Fisher, Australia & Mr Roberto Crosti, Italy

Management and experiments of weeds in Mediterranean countries

Applying cover crops to reduce impacts of Egyptian Broomrape in infested fields
Ms Mitra Ghotbi, Ms Ma. Ghotbi, Mr Amini Dehaghi, Iran, Ahmet Uludag, EEA

Biological characteristics of Giant sumpweed seed (*Iva xanthifolia Nutt.*) and the possibilities for fighting it by using soil herbicides

Ms Dragana Marisavljevic,Mr Branko Konstantinovic, Ms Danijela Pavlovic, Ms Maja Meseldzija, Serbia

Allelopathic potential of rice (*Oryza sativa* L.) cultivars on barnyard grass (*Echinochloa crus-galli*)
Ms Leila Jafari, Mr Hossein Ghadiri & Mr Ali Moradshahi, Iran

Biological control

Solanum elaeagnifolium, an emerging invasive weed in the Mediterranean region and Northern Africa
Mr Javid Kashefi, Greece

Evaluation of Indigenous Fungi as Potential Biological Control agents to Cocklebur (*Xanthium strumarium* L.)
Ms Alloub Hala, Sudan

Presentation of the small workshops

Small Workshop Session 1.1

Using the prioritization process for Mediterranean countries

Chaired by Mr Guillaume Fried (fried@supagro.inra.fr) and Ms Sarah Brunel (sb@eppo.fr)

Description of the project
The European and Mediterranean Plant Protection Organization is in the process of developing a prioritization process for invasive alien plants which aims:

- to produce a list of invasive alien plants that are established or could potentially establish in the EPPO region;
- to determine which of these invasive alien plants have the highest priority for an EPPO pest risk analysis.

This process consists of assessing plants through simple and transparent criteria such as the spread potential of the plant, the potential negative impact of the plant on native species, habitats and ecosystems, etc. This process is currently under use and testing in France and in Belgium. It is being implemented through workshops where experts bring their results for specific plants, and compare and discuss these. Such a tool eases the dialogue among experts and the homogenisation of definitions, and allows lists of invasive alien plants to be drafted giving priority at a regional scale. This could be done at the scale of the Mediterranean area.

Aims of the small workshop

- make the prioritization process known

test the process for the 5 following invasive alien plants relevant to the Mediterranean area: *Cortaderia selloana* (Poaceae), *Solanum elaeagnifolium* (Solanaceae), *Ludwigia grandiflora* & *L. peploides* (Onagraceae) and *Fallopia baldschuanica* (Polygonaceae).

Tasks for the coordinators prior to the workshop

- the document describing the prioritization process will be sent to the participants of the small workshop

Tasks for the participants prior to the workshop

- participants would have read the documents sent prior attending

the participants would have gathered information and run the process for the 5 species to be tested: *Cortaderia selloana* (Poaceae), *Solanum elaeagnifolium* (Solanaceae), *Ludwigia grandiflora* & *L. peploides* (Onagraceae) and *Fallopia baldschuanica* (Polygonaceae).

Links with other small workshops
This process will be presented during an oral presentation in session 1 by Guillaume Fried. General work on lists of plants for the Mediterranean would have been presented in the opening speeches by Giuseppe Brundu, Guillaume Fried and Sarah Brunel.
The small workshops on eradication and early warning could take the prioritization process into account in their discussions.

Small Workshop Session 1.2

Alien trees in the Mediterranean countries: focussing on *Acacia* spp.

Chaired by Ms Genevieve Thomson (gen@sun.ac.za) and Mr Giuseppe Brundu (gbrundu@tin.it)

Description of the target species

Many species of the genus *Acacia* have been voluntarily introduced by humans in numerous Mediterranean Type Regions of the World, mainly as silvicultural and ornamental species. There are however, many other uses including the stabilisation of sand dunes and land reclamation; the use as a livestock fodder, for leather tanning and fuel; as a medicine, paint or perfume. For instance, *Acacia* spp. are grown in the USA for sale as cut flowers. *Acacia dealbata* is a popular plant in Europe and has been grown in Southern France and Italy (since 1918), and sold as a cut flower under the local common name "Mimosa". *A. baileyana purpurea* is also grown in Israel for its cut foliage. Today, products from a number of *Acacia* species are utilised commercially in Australia and throughout the world. The timber of *A. melanoxylon* is highly valued for building and furniture making, while lower quality timbers from other species have been used for fence construction. Plantations of fast growing Australian *Acacia* species are being planted in developing countries as a source of firewood, where population growth has led to the depletion of the native tree species which were traditionally used as a fuel source. More recently, *Acacia* is also being considered as a biomass producer in short rotation coppice systems. As with other invasive alien plants of the legume family, the success of many *Acacia* species outside their native ranges has been attributed to their ability to fix nitrogen, their tolerance to fire, high seed production, and allelopathic effects. Some of these traits are also responsible for rendering the eradication/control of acacias more problematic.

Aims of the small workshop

The scope of the workshop is to raise awareness on species within the *Acacia* genus in all Mediterranean Type Regions of the World; as well as to compile an inventory of all the introduced/naturalised species. Furthermore, the workshop aims to build a network of interested people/stakeholders for further research activities/projects and to prevent the un-regulated entry and spread of these species through common actions across the respective regions.

Tasks for the coordinators prior to the workshop

Prepare a general list of *Acacia* species cultivated/naturalised in the Mediterranean Type Regions of the World with main cultivation purposes/introduction pathways.

Tasks for the participants prior to the workshop

Collect information on *Acacia* species concerning their own country/region (species, sub-species or hybrids, pathways, distribution, threats, legislation, programme for eradication/control etc.) prior to attending.

Links with other small workshops

- General work on lists of plants for the Mediterranean.
- Small workshops on eradication, early warning and the prioritization process should consider this small workshop in their discussions.

Small Workshop Session 1.3

Similarities and differences between distribution of invasive alien plants in the Black Sea and Mediterranean area

Chaired by Mr Necmi Aksoy (necmiaksoy@duzce.edu.tr)

Description of the project

The main goal of this project is to evaluate the similarities and differences between the distribution of invasive plants in the Black Sea and in the Mediterranean Area, and in particular:

- to understand the components of the Mediterranean Flora and the Euro-Siberian Flora in the Black Sea area;
- to list the invasive alien plants common to the Black Sea and the Mediterranean areas;
- to list the differences in invasive alien plants in the Black Sea and the Mediterranean areas;
- to compare which of these plants pose the highest risk of invading the Black Sea and Mediterranean areas;
- to observe the invasive characteristic of alien plants in the Black Sea and in the Mediterranean areas.

The workshop consists of observing and identifying plants through their invasive characteristics through criteria such as the spread potential of the plants, their potential negative impacts on the native species, habitats and ecosystems in the Black Sea and Mediterranean areas. We may also develop new means to observe and compare the invasive plants of both regions. Through understanding the invasive plants in the Black Sea area wewill discuss and test whether it is possible to transfer the methods which are being implemented in the Mediterranean area.

Aims of the small workshop

- to define the differences and similarities of the alien plants in the Black Sea and the Mediterranean areas;
- to make a list of the priority invasive alien plants in the Black Sea area;
- to monitor some invasive alien species of the Black Sea area during the field trip of the workshop;
- to consider methods to control the invasive plants in the Black Sea area.

Tasks of the coordinator of the workshop

- to send a document describing the Mediterranean Flora in the Mediterranean area and the Euro-Siberian Flora in the Black Sea area to the participants of the small workshop prior to the workshop;
- to show some of the alien plants to the participants of the workshop during the field excursion;

Tasks for the participants prior to the workshop

- participants are advised to read the document prior to attending;
- they are also advised to make the necessary preparations for the field excursion

Links with other small workshops

This small workshop is particularly linked with the field trip.

Small Workshop Small Workshop Session 2.1

Building an Early Detection Rapid Response (EDRR) for the Mediterranean

Chaired by Mr Kassim Al-Khatib (kalkhatib@ucdavis.edu) and Mr Ahmet Uludag (ahuludag@yahoo.com)

Description of the project

Early detection of invasive alien plants and quick coordinated responses are needed to eradicate or contain invasive plants before they become widespread and control becomes practically and/or financially difficult. Although early detection and rapid response are important elements of invasive plant management, currently there is no comprehensive regional system for detecting, and monitoring invasions of alien plants in the Mediterranean region.

The group will discuss the existing EDRR in different locations of the region. EDRR system may exist in certain locations; however, inadequate planning and technologies, insufficient resources and information hindered EDRR efforts in other locations.

The workgroup will discuss ways to develop plan to coordinate efforts and improve networking for the purpose of developing regional detection system.

Aims of the small workshop

- Determine critical needs and resources to develop regional EDRR
- Develop and priorities species lists for EDRR
- Allow access to reliable, effective, and affordable invasive plants management information
- Facilitate rapid and accurate species identification
- Establish procedure for rapid risk assessment
- Discuss mechanisms for coordinating the efforts of regional agencies and authorities to address EDRR.

Tasks for the participants prior to the workshop

- Participants would have read this document prior attending
- Prepare a short report on existing EDRR in your location
- What is the preferred EDRR system for your location
- Develop a vision of how you can contribute to a regional approach of EDRR and what are the limitations.

Links with other small workshops and presentations

- Related information will be presented and discussed in different session. Presentations of particular interest are:
- Similarities and differences between distribution of invasive alien plants in the Black Sea area and Mediterranean area, *Chaired by Mr Necmi Aksoy*
- Using the prioritization process for Mediterranean countries, *Chaired by Mr Guillaume Fried and Ms Sarah Brunel*
- Effectiveness of policies and strategies in tackling the impacts on Invasive Alien Species on biodiversity in Mediterranean ecosystems in South-West Australia, *Ms Judy Fisher, Australia*

Small Workshop Small Workshop Session 2.2

Identifying targets for eradication in the Mediterranean and eradication experiences

Chaired by Mr Eladio Fernandez Galiano (Eladio.FERNANDEZ-GALIANO@coe.int)

Description of the project

While eradications are considered a very efficient technique to manage invasive alien species, very few have been undertaken for plants in European and Mediterranean countries. One of the difficulties of such a task lies in the identification of those species that are still of limited distribution, but have the potential to have deleterious impacts and to spread further. The practical application of eradication, although being inexpensive and very cost effective if taken at an early stage, needs to be promoted through concrete cases. The Council of Europe has published a recommendation (n°126 in 2004) of examples of invasive alien plants to be eradicated (see appendix 1 below), and aims to help countries implement such action. The Council of Europe will work with its Member states to in the coming years to develop projects of eradication of invasive alien plants

Aims of the small workshop

- identify 5 or 6 invasive alien plants in Mediterranean countries that represent good targets for eradication
- for each of the cases, clarify the stakeholders involved, the technique(s) to be used, the material and personnel needed, the budget, and communication methods.
- identify international expertise to be associated with each eradication case.

Tasks for the participants prior to the workshop

- Participants should identify possible cases of eradication in their own country.
- Participants should document each potential case of eradication (situation, stakeholders, method to be used, budget, communication, etc.).

Links with other small workshops

- the small workshops on the prioritization process (1.1), on EDRR (2.1) and on early warning in North-African countries (2.3) might highlight species that would be suitable for eradication.

Appendix 1

The species listed in the recommendation 126 of the Council of Europe for which eradication or containment is recommended in Mediterranean countries are:

Species	**Ecosystems**	**Countries in which the species occurs**
Hydrocotyle ranunculoides	Uncultivated	Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, the United Kingdom. Italy, Palestine, Israel.
Pueraria lobata	Uncultivated	Italy, Switzerland.
Solanum elaeagnifolium	Uncultivated and cultivated	Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, "the former Yugoslav Republic of Macedonia, Moldova, Montenegro, Morocco, Serbia, Spain, Syria, Tunisia.

Other examples of species that have high capacity of spread and potentially high impacts:

Species	**Ecosystems**	**Countries in which the species occurs**
Araujia sericifera	Uncultivated	Spain, France
Bothriochloa barbinodis	Uncultivated and cultivated	France
Cenchrus incertus	Uncultivated and cultivated	Spain, Italy, Romania
Cotula coronopifolia	Uncultivated	Portugal, Spain, Italy
Eichhornia crassipes	Uncultivated	Portugal, Spain
Fallopia baldschuanica	Uncultivated	Czech Republic, Spain, Italy, Slovenia, France, UK
Hakea salicifolia	Uncultivated	Portugal
Hakea sericea	Uncultivated	Portugal, France
Myriophyllum heterophyllum	Uncultivated	Spain, Germany
Pistia stratiotes	Uncultivated	Spain
Senecio deltoideus	Uncultivated	France
Sesbania punicea	Uncultivated	Italy

Small Workshop Session 2.3

Cooperation/inclusion of North African Countries in European early warning system

Chaired by Mr Mohamed Bouhache (m.bouhache@gmail.com) and Mr Riccardo Scalera (riccardo.scalera@alice.it)

Why cooperation/inclusion?

Biological invasions of alien plants and their pests do not only threaten biodiversity of concerned regions. They also affect the well-being and economies of human populations, endangering ecosystems and transforming landscapes. The movement of people and goods in the Mediterranean basin has favoured biological invasions in the regions since early times in human history. Today, since trade and tourism activities are very developed between Europe and North Africa, opportunities to exchange invasive alien species continue to be very high. Thus, our regions need to establish or to share an early warning framework and information system in order to be able to detect and react promptly to new invasions in order to respond to their ecological and economic threats. This requirement also complies with one recommendation of the European Strategy on Invasive Alien Specie adopted by the Council of Europe, which supports the development of effective systems to share IAS information with neighboring countries, trading partners and regions with similar ecosystems. While the European early warning strategies are in the course of being developed at both the EU level and at the level of single countries (e.g. Ireland) and regional networks (i.e. NOBANIS), the early warning and information system capacities of North African counties are still very limited.

Aims of the small workshop

- make the European early warning system known to North African countries;
- include (or cooperate with) North African countries in European early warning system;
- define the scope and objectives of the cooperative actions;
- share concepts and terminology;
- identify countries and/or authorities concerned in North Africa;

Tasks for the coordinators prior to the workshop

- the document describing the European early warning system will be sent to the participants of the small workshop.

Tasks for the participants prior to the workshop

- participants would have read the document prior attending
- develop ideas on how to launch this cooperation or inclusion.

Links with other small workshops and sessions

This workshop will be preceded by three oral presentations:

- by Riccardo Scalera: Towards an early warning and information system for invasive alien species (IAS) threatening biodiversity in Europe (in opening speeches session);
- by Kassim Al-Khatib: Stages in the Development of an Early Detection and Rapid Response (EDRR) Program for Invasive Plants (in session 2)
- by Philip Ivey: Establishment of a National early detection and rapid response programme - some early lessons (in session 2).

The recommendations of the small workshop on the prioritization process may be taken into consideration in the early warning workshop progress.

Small Workshop Session 3.1

Implementing Codes of conduct on horticulture and invasive alien plants for the Mediterranean

Chaired by Prof. Vernon Heywood (vhheywood@btinternet.com)

Context

The Code of Conduct on Horticulture and Invasive Alien Plants is a joint initiative of the Council of Europe (CoE) and the European and Mediterranean Plant Protection Organization (EPPO). It is addressed to governments and the horticultural industry and trade – plant importers, commercial nurseries, municipal nurseries, garden centres, aquarists – and to those who play a role in deciding what species are grown in particular areas, such as landscape architects, municipal parks and gardens departments, recreation and leisure departments. Its aim is to help prevent the spread of alien invasive species already present in Europe and prevent the introduction of possible new plant invaders into Europe. The Code is voluntary and its effectiveness will depend on how far the horticultural industry and trade are willing to adopt the guidelines and good practices proposed in it. To achieve this, it is necessary to raise awareness on this topic among the professionals concerned.

Aims of the workshop

- to examine how far the Code is being implemented in the countries bordering the Mediterranean
- to determine the main types of problem encountered in implementing the Code
- to seek solutions to the problems identified or propose how they may be addressed
- to consider whether there are any special factors that might affect the relevance and implementation of the Code to Mediterranean countries
- to examine links with other European, regional and national initiatives which aim to control or prevent entry of new and emerging invasive plant species

Tasks for the participants prior to the workshop

- to familiarize themselves with the Code (it is available in English, French and Spanish)
- to ascertain, as far as possible, the response to the Code in their country and prepare a short note summarizing this
- to find out if there are other national Codes of conduct that may be relevant to the CoE/EPPO Code and its implementation in the Mediterranean

Links with other small workshops

Most of the other small workshops address issues that are relevant such as prioritization, identification of target species, early warning, control and eradication and the need for communication with stakeholders.

Small Workshop Session 3.2

How to communicate on IAP? Effective involvement of stakeholders in addressing IAPs

Chaired by Ms Elisabete Marchante (elizabete.marchante@gmail.com)

The control and management of widespread invasive species is extremely difficult and costly. Therefore, the best way to deal with invasive species is to start by preventing their introduction. Because every person is a potential vector for species introduction, it is necessary to start by educating the different publics about the problem and the species involved. A well-informed public can then contribute to the prevention, early-detection and management of invasive species. This small workshop aims to explore ways how scientists and practitioners engage with the public.

Aims of the small workshop

- Understand the importance of science communication on IAP
- Discuss different approaches used to communicate on IAP
- Discuss ways to assess success of communication on IAP

Tasks for the coordinators prior to the workshop

- Select amongst the abstracts received from the participants 4 or 5 examples and suggestions to be presented and discussed during the small workshop

Tasks for the participants prior to the workshop

- Participants would have prepared and sent to the coordinator a small abstract about ways/strategies they use (or would like to test) to communicate on IAP

Links with other small workshops

The small workshops on eradication and early warning could take communication into account in their discussion.

Small Workshop 3.3

Biofuel crops in the Mediterranean: exploring the use of risk species

Chaired by Mr Pierre Ehret (pierre.ehret@agriculture.gouv.fr) nd Mr Roberto Crosti (roberto.crosti@isprambiente.it)

Increase demand for energy in the Mediterranean Regions enhanced the development of large scale biofuel cropping systems consisting of the use of plant biomass for energy production.
Energy can be generated from ethanol, oil and combustion produced from plant material. In addition, recently, many businesses are investing in technologies (molecular genetics and engineering) to provide fuel from microalgae.
To gain real environmental benefits, however, biofuel crops need to be farmed in an environmental sustainable manner. Major concerns include the loss of biodiversity, as a consequence of the potential escapes of aggressive crops cultivars which can compete, in the wild, with native vegetation. Several biofuel species or cultivars have traits in common with invasive species and may harm both the farmland biodiversity and functionality. Many of those potential biofuel crop species, selected for broad ecological amplitude, rapid growth, high seed production, vegetative spread, resistance to pests and diseases are, in fact, potentially invasive. Furthermore, in farmlands, habitat modification, distorted water balance and nutrient cycle, altered fire regimes and abandonment of arable lands might contribute to the establishment of invasive species in new or temporarily "vacant niches". Planting massive quantities of vigorous plant varieties on a large scale by repeated introductions, often supported by economic subsidies, in different climates and soil conditions increases the propagules pressure and likelihood of "crop escape", with subsequent, establishment of new biological invaders. Many of the proposed biofuel crops in the Mediterranean basin are already considered invasive elsewhere.
On the other hand, some biofuel crops may have showed less aggressive trends, but this kind of information might not be often published and would be useful to share.
During the WS a presentation of the preliminary results of a survey on Short Rotation Coppicing species which under the EU common agricultural policy (CAP) are granted support payments (each member state defines the species).

Aims of the workshop

- To raise awareness of potential invasiveness of biofuel species;
- To set up a network to monitor both "field escapes" and "legislative acts";
- To verify if, in Mediterranean type Regions, escapes have already occurred and if native habitats have been harmed.
- To share experience concerning monitoring systems of biofuel species

Tasks for the participants prior to the workshop

- registered participants will get, by e-mail, several papers on the topic
- to respond to the questionnaire

Tasks for the coordinators prior to the workshop

- the chairmen of the small workshop will circulate a questionnaire and several papers and aggregate the results to be presented during this small workshop

Links with other small workshops

Posters and talks in the meetings (e.g. by the chairmen in the same day of the workshop).

Small Workshop 4.1

Field Trip: hands on survey for alien weeds

Chaired by Mr Giuseppe Brundu (gbrundu@tin.it) and Mr Necmi Aksoy (necmiaksoy@duzce.edu.tr)

Description of the activity and related final workshop
The idea behind the two-day field excursion is not only to visit remarkably interesting sites from the environmental and cultural point of view, but also locations that, so far, are poorly studied from the point of view of plant invasions and exotic floras and inventories, thus to collect useful information and eventually to write an excursion report or possibly a short paper that could represent a preliminary contribution towards the exotic flora of a larger area. Field activities will be discussed during a workshop.

Aims of the activity
During the two days of the excursion different sites will be visited. In each site, according to the number of participants, the group could be divided in 2-3 sub-groups, having the possibility to survey a larger area, taking photos, recording locations by GPS positioning and other relevant information or data, and collecting plant samples.

Tasks for the coordinators prior the workshop
It is advisable to collect as much available information as possible on the study area in advance. The local botanists will be in charge to provide local "grey" literature on (invasive) alien plants and copies of the Turkish flora (or parts of it) that could be used for plant identification (and possible other "botanical" tools for plant identification and collection tools, such as lenses, paper sheets etc.).

Tasks for the participants during the field-trip and the workshop
During the field trip it is advisable to assign specific task to each component of the group, even if the same task (e.g. making photographs) could be done by more than one person. Example of specific tasks are e.g., making photographs, taking notes, collecting specimens as herbarium samples, interviewing people, taking note, collecting GPS points etc.
At the end of the field trip participants will be asked to share the collected data, photos and information with the other participants and with workshop coordinators, and will be involved in writing the report of the excursion as co-authors and in discussing the results. Those that are not interested will be only acknowledged as participants.
Collected herbarium samples will be available for further determination and for documenting the activity and as a basis for the exotic flora of the surveyed sites. Samples will be stored in Turkey.

Links with other small workshops
The small workshops on Mediterranean lists, eradication and early warning could take the hands-on results into account in their discussions.

Small Workshop 4.2

Building a network for the control of *Ambrosia artemisiifolia* in the Mediterranean

Chaired by Mr Christian Bohren (christian.bohren@acw.admin.ch) and Ms Martha Okumu (nelmak2212@yahoo.com)

Description of the project

Ambrosia artemisiifolia is an invasive alien plants causing severe allergies. It is present in many European countries (Croatia, France, Italy, Switzerland, etc.). Networks of experts including botanists, agronomist and allergists have been created to monitor this species and raise awareness among the public. The European Weed Research Society is deeply involved in the topic, and has built a network to share information on the species and enhance research into its biology and management.

Aims of the small workshop

- Raise awareness on the plant.
- Build a network of experts interested in contributing to the existing networks on *Ambrosia artemisiifolia*.

Tasks for the participants prior to the workshop

- Investigate the presence/absence, distribution and abundance of *Ambrosia artemisiifolia* in his/her country.
- The effects and control strategies being adopted to combat the spread of *A. artemisiifolia* in participant's respective countries

Links with other small workshops

the small workshops on) Early Detection and Rapid Response (2.1) and on early warning in North-African countries (2.3) might help monitor the species in additional countries.

Small Workshop 4.3

Measures preventing the introduction of invasive plants in arable crops

Chaired by Ms Garifalia Economou (cagr2ecg@noc.aua.gr) and Mr Ahmet Uludag (ahuludag@yahoo.com)

Description of the project

Biological invasions are large-scale phenomena of widespread importance, which represent one of the major threats to European biodiversity. Regardless of the mechanism, it is clear that the impact of the invasive species on natural plant communities, may also cause major economic problems, with invasive species becoming established as highly persistent and vigorous agricultural weeds, damaging manmade environments or choking open spaces and waterways. Several economic and environmental drivers markedly increase ecosystem vulnerability to invasion such as agriculture land and particularly arable crops. Species such as *Solanum eleanifolium, Ipomoea hederacea* in corn, *Avena fatua,* in winter wheat and *Conyza albida* in alfalfa are considered as the most problematic, fast- growing, easily propagated and vigorous competitors in the arable crops listed above in the Mediterranean zone. It is widely known that the application of conventional weed control methods has proved inadequate to prevent the rapid dispersal of these invasive species to a variety of habitats and therefore to enter crop fields. The prevention and mitigation of impacts of invasive species demands the action of "*developing measures aimed at the control of invasive alien genotypes as well as specific actions including an early warning system*". Through this workshop the experts will draw on their experience in order to create a baseline for priorities definition at a regional scale.

Aims of the small workshop

Documentation of the problem

- Reference to the arable crops invaded by alien species
- Reference to the main invasive alien plants
- Assessment of the invasive plants abundance and population trends
- Effect of climatic change on alien plant invasion
- Proposed control methods

Tasks for the coordinators prior the workshop

A document will be circulated to the participants describing:

- the thematic issues in order to collect updated data in respect to their experience
- the control methods that proved ineffective at a regional scale
- the agronomic practices and the land use change at a regional scale
- Climatic data at a regional / country scale

Task for the participants prior to the workshop

The participants should have collected information prior to attending

Links with other small workshops

- General work on list of alien plant invasion
- Workshops on eradication and early warning

Abstracts of oral presentations

Flora of Turkey: Richness, updates, threats,

Mr Necmi Aksoy, Turkey

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The flora of Turkey is rich and diverse with over 11 000 flowering taxa recorded in the 9-volume set of Prof. P.H. Davis' monumental work and its two supplements. Turkey is situated at the junction of three important phytogeographic regions, namely Mediterranean, Irano-Turanian, and Euro-Siberian. The Black Sea's coastal areas are in the Euro-Siberian region. Areas surrounding the Mediterranean, Aegean, and Marmara Seas enjoy the characteristics of the Mediterranean regions, and finally, the large part of Turkey stretching from the Central Anatolian Plateau to the borders with Iran and Iraq to the East and Southeast lies in the Irano-Turanian region. Endemic species are largely found in the Mediterranean and Irano-Turanian regions. The Anatolian flora, especially in the steppe areas, is said to be in an active state of diversification. According to the Flora of Turkey, the flora contains just over 11000 infrageneric taxa, of which 34.5 % are endemic. In the flora of Turkey, percentage endemism is high in some families: *Boraginaceae* (61%), *Campanulaceae* (60%), *Scrophulariaceae* (52%), *Rubiaceae* (48%), *Caryophyllaceae* (46%), *Labiatae* (45%), *Leguminosae* (40%), *Compositae* (37%). At generic level, examples of the rate of endemism are: *Bolanthus* (90%), *Ebenus* (90%), *Alkanna* (8l%), *Sideritis* (78%), *Acantholimon* (76%), *Paronychia* (75%), *Verbascum* and *Gypsophila* (71%), *Paracaryum* (70%), *Cousinia* (68%), *Centaurea* (65%), *Astragalus* (63%). The flora of Turkey contains over 11 000 vascular plant taxa, a considerable number of which are used by humans. Non-food uses of plants include medicinal, aromatic, ornamental, pesticides as well as raw materials for making household goods, toys, musical instruments. The flora of Turkey is estimated to contain over 3000 aromatic plants. The wide biodiversity of the flowering plants of Turkey is reflected in the 11-volume set of books titled Flora of Turkey and the East Aegean Islands. The second supplement (Vol. 11) reported 532 new taxa for the flora of the region. Recently, publications reported that 48 new recorded and 135 new species are added to the Flora of Turkey and the following genus were recently included : *Clastopus, Adenostyles, Araujia, Perilla, Oreopoa, Diplachne, Asperuginoides, Leptaleum, Stroganowia, Loncomelos, Scopolia, Oclopoa, Chamaespartium, Lophanthus, Clerodendrum, Cymbopogon , Schistophyllidium, Sicyos,* etc. If the alien and cultivated taxa are included, the number of taxa occurring in the Flora of Turkey then rises to 11 500. Of 3504 endemic plants in Turkey, 12 are known to have been extinct and 3492 (99 %) are still being threatened. The main threats to the survival of Turkey's endemic plants are: clearing grounds for fields, overgrazing and reform of barren lands, construction of dams, industrialization and urbanization, exportation and domestic use, plant protection and pollution, tourism, forestation and fires.

Impacts of global change on plant life in the Mediterranean region and the spread of invasive species

Prof. Vernon Heywood, UK

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The Mediterranean region is a focus of attention because of its unique climatic features that appear to be very sensitive to climate change. It is widely agreed that it is one of the areas that will be severely affected by the accelerated change that is predicted over the course of the 21st century. A recent evaluation anticipates substantial changes of temperature of more than 4^{o} C by the end of the century. This will have an effect on the amount of evaporation and the water economy, with the probable consequence of water shortages, and changes in disturbance regimes such as increased frequency and duration of forest fires. The Mediterranean region occupies a unique role in the context of climate change and its effects on biodiversity because it acts as a barrier to the migration of many plant species from south to north during the timescale of concern. Because of the lack of a hinterland that characterizes the climatic zone of the comparable Saharan hinterland, a new climate will develop in Mediterranean Europe as a consequence of climate change. It is difficult to imagine what type of vegetation will occupy this space without extensive migration of species from North Africa although some species will probably arrive through long-distance dispersal. It will, however, be vulnerable to invasive and weedy species and it is probable that those which already occur there will persist or extend their ranges while new species will become established. Novel conservation approaches, such as human-assisted migration of species, being proposed as a response to the effects of climate change, may themselves pose risks, including the possibility of the translocated species becoming invasive and disrupting ecosystems. Strategies need to be planned now in cooperation with conservation agencies to try and mitigate the expected increase in the impacts of alien invasive species in the region.

New mechanisms invasive alien plants might employ for their success

Prof. Inderjit, India

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Some exotic plants competitively exclude their neighbours in invaded communities but coexist with neighbours in species-diverse native communities. Allelopathy could be a possible mechanism for the invasion success of some exotic invasive plants, in part because of the need for an unusually powerful mechanism to explain why invaders often establish virtual monocultures where diverse communities once flourished. Here I will discuss the role of soil communities, volatile organic chemicals and defence chemicals in the invasion success of some of the worst exotic invasive plants of Indian subcontinent.

Invasive Weeds threats and strategies in Gangetic inceptisols of India

Prof. Ratikanta Ghosh, India

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Climate change and the import of foodgrains & seeds are the two major causes for the invasion of the many weeds in the Gangetic Inceptisol of India. Increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century 0.74 ± 0.18°C (due to variable data 1950 – 2000) to 1.1 to 6.4 °C in 21st century. Holding 2.4% Worlds' land area and 10 Bio Geographical zones, India has 8% of Worlds' biodiversity and is 10th among plant rich nations of the World (4th among Countries of Asia). India has 42 Vegetation types, 16 major Forest types, approximately 1, 26,188 species covering all 5 Kingdoms including 9000 higher plant species (flowering plants are 17,000 species). Due to climate change we have also 25 hot spots of Endemic Centre & Endemic species 5725 (33.5%) and most of these species are under the weed pest category. In recent decades the reduction in India's plant species is 10 % & so in flowering plants besides more than 150 Medicinal plants. More than 32 weed pests have invaded since mid 1990s via the import of seed. In India production losses due to pests is 33 % and out of this, the major pest weed plant alone causes 37 % yield losses. The National food production that is hovering around 210 mt in the last decade, a shortfall of 20 mt at present and during 2020 the target is to produce 270 mt. In addition the bufferstock of foodgrains is also reduced by 35 % showing alarming situation as the population is increasing at a rapid rate. Management of these invasive weed pests are, therefore urgently needed in addition to proper management of soil and water resources to increase the food production and also for India's food security.

Survey & Surveillance at this Viswavidyalaya under the National Weed Surveillance Programme, Ministry of Agriculture, Government of India revealed that in the anaerobic ecosystem *Eichhornia crassipes, Oryza rufipogon, Aneilema vaginata, Panicum repens, Eriocaulon sieboldtianum, Eleocharis congesta, Fimbristylis dichotoma, Scirpus mucronatus, Cyperus microiria, Cyperus serotinus, Cyperus polystschyos, Cyperus fulvo-albescens, Alternanthera philoxeroides* etc. and in Aerobic ecosystem *Elatine triandra, Phalaris minor, Tithonia rotundifolia, Cynoglossum germinacum, Polygonum plebium, Desmodium triflorum, Trichodesma indicum, Euphorbia heleoscopia, Euphorbia heterophylla, Cardenthera triflora* etc. are common invasive weeds. In the Non crop areas, Roadside & Wasteland ecosystem *Parthenium hysterophorus, Cleome rufidosperma, Solanum incanum, Pergularia daemia, Rouvolfia tetraphylla, Hibiscus subdarifa, Acanthus ilicifolius, Desmodium laxiflorum, Solanum viarum, Solanum miriacanthum, Solanum indisanum, Solanum diphyllum, Miscanthus sacchariflorus* etc. have also invaded and some of them are now entering the crop fields. During 2007-08 five more invasive weeds *Cenchrus tribuloides, Ambrosia trifida, Viola arvensis, Cynoglossum officinale and Solanum carolinenses* have entered in India with imported wheat foodgrains.

Research on biology of these invasive weeds at this Viswavidyalaya during the past decade showed the possibilities for proper way for their management. Utilizing this invasive weed flora in various agricultural and social purposes including compost making, biopesticides, biogas, biofuel, herbal technology etc. that create employment are so far identified as the best measure in addition to usually applied chemical or physical method of weed control. Awareness through people participation including the farmer is the most common strategy for tackling these alien invasive weed pests.

Niche modeling in invasive plants: new insights to predict their potential distribution in the invaded areas

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A basic assumption to explain plant invasive success is niche stability. This implicates that the requirements of plants in their original habitats are sufficient to predict the potential distribution in the invaded environments. However, the explosive spatial spread of some plants encompassing a large diversity of ecosystems, suggests that niche(s) may change during the invasion process.

The niche modeling approach constitutes a fruitful research avenue used to predict the potential distributions of invasive plants. These models relate the occurrence of species to climatic information. This method gives the statistical significance of climatic variables that better describes the species niche and the potential geographic distribution of a species as well (including the probability of occurrence).

We examined the climatic niche of *Eschcholzia californica*, an exotic plant originating from California (USA), based on the occurrences documented for this species in California and Chile. In addition, we used relevant climatic information that might explain the observed spread pattern. Our aims were to compare the niche models and the predicted distributions between California and Chile. Preliminary information indicates niche differentiation between Chile and California with a significant spatial expansion of the species along altitudinal and latitudinal gradient; adaptive evolution could explain this pattern of expansion in Chile.

Bern Convention on invasive alien plants, the Code of conduct on horticulture and invasive alien plants

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The Council of Europe was founded in 1949 and seeks to develop throughout Europe common and democratic principles based on the European Convention on Human Rights and other reference texts on the protection of individuals. The Council of Europe is composed of 47 member countries and one applicant country.
The Convention on the Conservation of European Wildlife and Natural Habitats was adopted in Bern in 1979. It counts at present 44 Contracting Parties, one of which is the European Commission. The Convention has a three-fold objective:

- To conserve wild flora and fauna and their natural habitats
- To promote co-operation between states
- To give particular emphasis to endangered and vulnerable species and endangered natural habitats.

The Bern Convention gathers Ministries of Environment and is managed by a Conference of the Parties called "Standing Committee" which has met 20 times since the entry into force of the Convention in 1982.
Activities on Invasive Alien Species (IAS) started in 1984 with the launch of a general recommendation for member countries. Specific recommendations were then adopted on the control of *Caulerpa taxifolia*, on the control of the Ruddy Duck *Oxyura jamaicensis*, on the introduction of the American cottontail rabbit (S*ylvilagus* sp.) into Europe, on the control of the Grey squirrel (*Sciurus carolinensis*) and other alien squirrels into Europe, on the eradication of vertebrates, etc. In 2002, the European Strategy on Invasive Alien Species was adopted aiming to provide more guidance to countries to draw up and implement a national strategy on IAS. In November 2008, the "Code of conduct for Horticulture and Invasive Alien Plants", project developed in partnership with EPPO, was launched.

EPPO activities on Invasive Alien Plants,

Ms Sarah Brunel, EPPO

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The European and Mediterranean Plant Organization (EPPO) and the Council of Europe have conjointly drafted a Code of conduct on horticulture and invasive alien plants for European and Mediterranean countries, which was published in 2009. In Europe, it is estimated that 80% of the invasive alien plants are voluntarily introduced for ornamental purposes, and international trade is increasing yearly. This major pathway must be addressed urgently to prevent entry and spread of invasive alien plants, as at present, few legislation and management programmes are in place. Voluntary measures to tackle the problem and raise awareness among the horticultural sector and the public are therefore considered a priority.
This Code of conduct provides essential information for Governments and the horticultural and landscape sectors on regulation concerning invasive alien plants, plant waste disposal, labelling of plants, proposing alternative plants, publicity, etc.
This new and promising initiative now requires promotion and implementation within countries.

Role of the European Food Safety Authority in risk assessment of invasive species potentially harmful to plants

Ms Sara Tramontini[1], V. Kertesz[1], E. Ceglarska[1], M. Navajas[2], G. Gilioli[2], EFSA

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The European Food Safety Authority (EFSA) provides independent scientific advice and transparent communication on risks relating to the safety and security of the food chain in the European Community. The EFSA Scientific Panel on Plant Health addresses the increasing demand of EU risk managers for scientific advice on risks posed by organisms harmful to plants and plant products. Advice is published as scientific opinions which provide a basis for consideration of phytosanitary measures to protect against the introduction and spread of harmful or invasive species in the European Community, under Council Directive 2000/29/EC. Since its inception in 2006, the Panel has delivered forty-five scientific opinions on the risks posed by species of invasive plants, invertebrate pests and pathogens, and pathways for pest movement. In addition, two guidance documents have been published: the first one on the evaluation of pest risk assessment and the second on the harmonized process for pest risk assessment and the identification and evaluation of pest risk management options. A new mandate for the preparation of a third guidance document on the environmental risk assessment (ERA) of plant pests (invertebrates, diseases and plants) has recently started.

The approaches and methodologies currently under discussion in the EFSA ERA Working Group for the evaluation of the potential impact of invasive species to the EU environment will be presented. An important development foreseen will be the opportunity for collaboration between the Working Group and the scientific world engaged in the preparation of environmental risk assessment related to the introduction of exotic plants in the EU Mediterranean area.

Code of conduct on horticulture and invasive alien plants,

Prof. Vernon Heywood, UK

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It is estimated that about 80% of invasive alien plants in Europe have been are introduced through the horticultural industry and trade for ornamental purposes. This major pathway must be addressed to help prevent further entry and spread of invasive alien plants in Europe. Currently, only a few legislation instruments are in place and management programmes are limited. As an urgent first step, voluntary measures to tackle the problem and raise awareness among the horticultural sector and the public are needed. It is in this context that the Council of Europe and the European and Mediterranean Plant Organization (EPPO) have cooperated in preparing a code of conduct on horticulture and invasive alien plants for European and Mediterranean countries,. This code of conduct, published in 2009, provides essential background information and a set of guidelines for Governments and the horticultural and landscape sectors on regulation concerning invasive alien plants, plant wastes disposal, labelling of plants, proposing alternative plants, publicity, etc. The code is voluntary and requires action at the country level to promote and implement its recommendations.

Towards an early warning and information system for invasive alien species (IAS) threatening biodiversity in Europe

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In order to respond adequately to the threat of alien species, an effective early warning system should be based on a framework of activities. These include measures to detect the occurrence of new propagules and invaders, supported by activities to diagnose new species correctly and acquire all related information. Such information represents a necessary basis for science-based risk assessments that evaluate the severity of the threat and consequently identify the best options for managing the species.
Each element of the framework should be under the responsibility of one or more competent authorities acting at the European, national or local level. The procedure and protocols for an optimal circulation of information can vary according to the actual species in question, the region targeted and the available knowledge and tools (including legal instruments, when available). However, the efficiency of the system is guaranteed by an optimal and rationalised circulation of information among all involved actors through an effective European information system. For this reason, a key element for adequate coordination of all the activities in a regional EWRR is the establishment of a dedicated European technical scientific body. Such a body should ensure prompt and transparent access to high level scientific knowledge and expertise on the different aspects of the EWRR system, with the primary task of implementing and maintaining a European information system on alien species. Five possible options for establishing a dedicated technical scientific body are identified, implying varying levels of commitment by EU institution and Member States (including differing budgetary and personnel needs). A dedicated structure could take the form of a scientific panel, an observatory, or a centralised agency at the pan-European level. A further alternative is a simple network of experts and/or scientific institutions from individual European countries.

European Environment Agency: Activities addressing invasive alien species

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The European Environment Agency (EEA) assists the European Union and its Member States in designing effective tools to improve the environment, integrating environmental considerations into economic policies and moving towards sustainability. One key EEA task is coordinating the European environment information and observation network. In this context, EEA prepares reports, organizes outreach activities and develops tools and systems to assess the environment, mitigate harm and sustain ecosystem health. Invasive alien species (IAS) play an increasingly important role in EEA activities. IAS are considered the second most important threat to Europe's biodiversity after habitat fragmentation. Historically, EEA reports on the state of the environment have provided indications of IAS impacts on Europe's environment. The most recent report on the pan-European environment, the 2007 'Europe's Environment- The fourth assessment', provided more detailed information. IAS are among the indicators of threats to biodiversity in the SEBI 2010 (Streamlining European Biodiversity Indicators) indicator set. IAS are expected to acquire a more prominent role in future reporting processes. There is a political will to establish an early warning and rapid response system (EWRR) in Europe, as apparent in the European Commission's Communication COM(2008) 789 Final and Council conclusions in 2009 (2988th Environment Council meeting, conclusions on international biodiversity beyond 2010). On that basis, EEA is supporting efforts to establish an active and effective EWRR covering all EEA member and associate countries.

Results of the survey on invasive alien plants in Mediterranean countries

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A major step in tackling invasive alien plants consists of identifying those species that represent a future threat to managed and unmanaged habitats. The European and Mediterranean Plant Protection Organization reviews and organizes data on alien plants in order to build an early warning system. A survey has been launched prior to the workshop through the internet to any expert of the Mediterranean countries on plant considered invasive, elaboration of lists and sources of information used on the topic as well as eradication actions undertaken. The survey has received a good participation as about 30 answers were received from Armenia, Bulgaria, Croatia, France, Greece, Israel, Italy, Malta, Morocco, Portugal, Serbia, Spain, Tunisia, Turkey, as well as from California.
Although in recent years there have been efforts to produce Europe-wide databases of invasive alien plants, these data sets have to main limits, i.e. they need continuous updating and they do not take into considerations many of the Countries facing the Mediterranean basin.
The lists of invasive alien plants provided by the respondents will be aggregated to produce a overview of plants considered invasive in Mediterranean countries, although such meta list is not intended to be exhaustive. Within the EPPO framework, a prioritization system is being developed to select species that represent emerging threats and require the most urgent pest risk analysis to implement preventive measures and to perform eradication and management measures. So far, previous surveys and rapid assessments of spread and impact have allowed identification of emerging invasive alien plants for Mediterranean countries: *Alternanthera philoxeroides* (Amaranthaceae), *Ambrosia artemisiifolia* (Asteraceae), *Baccharis halimifolia* (Asteraceae), *Cortaderia selloana* (Poaceae), *Eichhornia crassipes* (Pontederiaceae), *Fallopia baldschuanica* (Polygonaceae), *Hakea sericea* (Proteaceae), *Humulus japonicus* (Cannabaceae), *Ludwigia grandiflora* and *L. peploides* (Onagraceae), *Hydrilla verticillata* (Hydrocharitaceae), *Microstegium vimineum* (Poaceae), *Myriophyllum heterophyllum* (Haloragaceae), *Pennisetum setaceum* (Poaceae), *Pistia stratiotes* (Araceae), *Salvinia molesta* (Salviniaceae) and *Solanum elaeagnifolium* (Solanaceae). Applying the prioritization process to the new meta list produced through the survey may allow identifying new emerging invasive alien plants. All respondents are invited to be associated to such task.
The extraction of the information provided in the survey will also allow the elaboration of an inventory of plant eradication actions. Sharing knowledge and promoting existing initiative shall raise awareness on eradication, which although very effective remains too scarcely used in European and Mediterranean countries.

One fall all or all for one? Evidence for cryptic invasions by multiple sub-species of the Port Jackson Willow (*Acacia saligna*)

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Invasive alien species have been shown to undergo local adaptation in their invasive range due to novel environmental stresses. Molecular research provides the opportunity to improve our understanding of both these selective and stochastic evolutionary processes, with the potential to shed light on management, prediction, and prevention. Several invasive Western Australian acacia species invade Mediterranean regions, in particular the *Acacia saligna* (Labill.) *H. L. Wendl*. species complex (four different sub-species) that generates dense monospecific stands in South Africa. We used microsatellites and a population genetic approach to study seven native, and ten invasive populations of *A. saligna*. Bayesian and frequency-based analyses suggest the presence of at least three different sub-species in South Africa. Furthermore, these different sub-species are disproportionally represented, and are admixing. Levels of genetic diversity (N_A, N_{PA}, H_E) are similar in the native and invasive range, with the majority of genetic diversity partitioned within populations. Isolation by distance was identified within the native range, but not within the invasive range. A history of multiple introductions and extensive, widespread planting is consistent with the observed high genetic diversity and low genetic structure demonstrated by our results. Numerous studies have documented the positive effects of admixture on invasability, often resulting in faster growing, larger, more aggressive genotypes, suggesting the need for multifaceted, integrated management strategies. Furthermore, since two of the sub-species have a strong propensity towards suckering, we advise against mechanical control methods. Introduced biocontrol agents in South Africa stem from a single locality in Western Australia, and we suggest multiple introductions of this agent to correspond to *A. saligna*'s invasive genetic diversity. Furthermore, identification of the sub-species will provide data to improve the predictive nature of bioclimatic modelling in South Africa, and other Mediterranean climates.

Prioritization of potential invasive alien species in France

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Given the number of alien species already present in France and the time needed to conduct a full pest risk analysis (PRA), a prioritization process appears to be a useful tool for a preliminary selection step. Existing screening processes often lack consideration about the technical feasibility of control and the current distribution of the species which are necessary to make a decision concerning eradication. We therefore applied the latest version of the Prioritization Process developed by the European and Mediterranean Plant Protection Organization (EPPO PP) on a selection of 303 alien species occurring in France or already invasive in neighbouring countries. In a first step, this process classifies species into four categories: species not considered invasive, species for an observation list, potential invasive species and invasive species. A second step selects those which are priority for a PRA from those already identified as potential and invasive species.

We compared the results with those provided by the risk assessment system developed by Weber & Gut (Journal for Nature Conservation 12 (2004) 171-179). This latter identifies three risk classes according to species scores based on their attributes and their environmental impact : low (3-20), intermediate (21-27) and high risk (28-39). Overall both methods yield similar results except for agricultural weeds which are not taken into account by Webber & Gut. *Solidago canadensis* (38), *Acacia dealbata* (37), *Baccharis halimifolia* (35) or *Fallopia japonica* (34) were identified among the species with the highest risk. These species are also considered invasive by the EPPO PP but they are already too widespread for a PRA to be efficient. The advantage of the EPPO PP is that it makes it possible to identify among species with high impact, emergent invasive (or potential invasive) species for which preventive action will be most profitable in France, e.g. *Alternanthera philoxeroides*, *Eriochloa villosa*, *Humulus japonicus*, *Myriophyllum heterophyllum*.

Forecast of further distribution of some invasive and expansive plant species in Armenia

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The main reason for the intensive spreading of invasive and expansive plant species is the disturbance of natural ecosystems. During the last years the majority of Armenian ecosystems were exposed to a very strong influence of anthropogenic factors. Global climate change will also promote further distribution of these species. According to climatologists forecast, average temperature increase by 5.7˚C and precipitation reduction by 27% is expected in Armenia over the period to 2100. This will cause a shift of the temperature conditions by 300-400 m up the mountain profile and precipitation reduction will contribute to aridization of the territory. These changes will enlarge the possible area of distribution for many thermophilic, Mediterranean invasive and expansive plant species, which grow at present on restricted territory of the lower mountain belt. On the other hand, it will limit the distribution of some hygrophilous invasive species. Using the computer program DIVA-GIS, we simulated possible changes in areas of distribution of 4 plant species according to different scenarios of climate change.

Ailanthus altissima is a very aggressive invasive species. Forecasted change of the climatic conditions will allow this species to enlarge the area of distribution on humid habitats.

Astragalus galegiformis is an expansive species, endemic of the Caucasus. In the last years it has spread very intensively in the territory of Armenia, and further expansion of this species is forecasted.

Silybum marianum was found in 1967 in South Armenia. During the last years its area of distribution was enlarged, and new populations were found in North Armenia. Further expansion of the distribution species is forecast.

Robinia pseudoacacia was very widely used in artificial plantations, especially along roads. At present it shows weak invasive potential, growing along streams and on wetlands in North Armenia. We forecast several enlargements of its area of distribution North Armenia only.

Noxious and invasive weeds in Greece: current status and legislation

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Not all weeds are equally aggressive and important. Noxious and invasive weeds are two groups of weeds that not only threaten agricultural production but also in many cases cause serious economic, social and environmental losses. Invasive weeds and generally invasive plants damage native ecosystems as well. The importance of these weeds has been recognized in the U.S.A. and ''noxious weed lists'' with relevant legislation have been established by the United State Department of Agriculture and most U.S.A. States. Similarly, Australia and New Zealand developed such lists and legislation (declared species). Also, in these and a number of other counties there are lists of invasive weeds and a lot of research is conducted. Despite all this, it is important to notice that in the EC and in Greece there is not any legislation concerning noxious and invasive weeds. Directive 2000/29/EC as amended by Directive 2009/118/EC concerning introduction into the EC of organisms harmful to plants or plant products does not include weeds. The EPPO Alert List is an indicative list developed by a scientific association and not a mandatory legislation of the EC or of a Member State. Examples of local weeds to be characterized as noxious in Greece (*Orobanche spp., Solanum eleagnifolium, Solanum rostratum*), new weeds introduced in Greece (*Ipomoea hederacea, Sida spinosa*), or weeds (*Ambrosia artemisiifolia, Solanum carolinense, Striga spp.*) to be excluded from entering Greece are given.

Due to the fact that there is no any national or EC legislation concerning noxious and invasive weeds such a piece of legislation is urgently needed and has been suggested. The Greek Weed Science Society will undertake a study to suggest to the Greek Department of Agriculture lists of noxious and invasive weeds in Greece.

A tales of two islands: comparison between the exotic flora of Corsica and Sardinia

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Alien plant species have been introduced to Europe throughout history. There are regions, such as the Mediterranean basin islands, where for thousands of years man has been responsible for the spread of ever-increasing numbers of plants taxa, introduced for different purposes or quite often entered accidentally and rarely controlled. The two geographically close islands of Corsica and Sardinia share similar features concerning the geological history, the native vegetation, the endemism rate and the land use dynamics in the coastal areas and surrounding islets. Nevertheless there are also specific differences, mainly in the inner mountain areas, where average altitude is markedly higher in Corsica than in Sardinia.

These insular systems represent a local hotspot for native biodiversity and an area of international interest for habitats and nature conservation.

Coastal areas of both islands also share similar features concerning the composition of their exotic floras and the distribution patterns and impacts of the main invasive aliens, such as *Carpobrotus* spp., *Cortaderia selloana, Oxalis pes-caprae*, to mention a few. Due to the geographical position, the two islands are in fact interconnected and there are frequent trade exchanges and tourism flux between them, thus increasing the probability for similar sensitive habitats to be invaded by the same invasive taxa. In this paper we compare the naturalised and casual alien plants of the islands of Corsica and Sardinia, highlighting common features and the main differences, with some indications for management.

New species threatening Moroccan biodiversity: *Verbesena encelioides* (*Asteraceae*)

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Verbesina encelioides (Cav.) Benth. Et Hook. Ex Gray is a invasive weed recently introduced in Morocco. It invaded completely the perimeter of Souss–Massa (region of Agadir). From there it was disseminated towards other areas: Safi, Rabat, Larache, Fez, Sefrou… This study was conducted in order to evaluate the infestation area, describe the morphological and ecological characteristics of *V. encelioides*, and point out threats of this species, on one hand, and study the effect of certain environmental factors on its seeds germination (temperature, photoperiod, water stress and burial depth), on the other hand. The surveys pointed out the importance of its infestation, ubiquity and its presence in areas more or less disturbed by man and its attraction of the white fly. The viability test of seeds revealed an average of 92% of viable akenes. The kinetics of imbibition was fast during the first 12 hours of incubation and it was slowed down beyond that. The tests of germination showed the capacity of the akenes to germinate in a temperature range of 8°C to 35°C with an optimum at 15°C/25°C, light and dark. Also, a reduction of water potential until -0,6 MPa did not affect germinative capacity of the akenes. However, the reduction of the water potential from –0.6 MPa to –1.3 MPa reduced the percentage of germination. The emergence seedlings occurred up to 3.5 cm of depth. The maximum of emergences was recorded at 1.5 cm followed by 0 and 2.5 cm and then 3.5 cm burial depth. Beyond 7 cm burial depth, the emergence did not occur. Regarding the growth and development, *V. encelioides* achieve life cycle (from emergence to the maturity of first akenes) in 80 days. It allocated more biomass to stems and branches and then inflorescences (starting from the flowering stage). Seed production was abundant and continuous for as long growing conditions permit.

Stages in the Development of an Early Detection and Rapid Response (EDRR) Program for Invasive Plants

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To develop an effective Early Detection and Rapid Response (EDRR) program, several factors need to be considered. Initially, a comprehensive list of current and potentially invasive species needs to be established in the region of interest. The California Invasive Species Advisory Committee recently developed such a list for invasive plants. Secondarily, a system must be established to rapidly and accurately identify new invasive plant within an area A third important phase of an EDRR program is the ability to predict the potential range of invasive plants. This can be accomplished by climate matching models. Preliminary work by the California Invasive Plant Council (Cal-IPC) mapped the distribution of 36 of the top 200 invasive species in the state. Using the climate matching program CLIMEX, they determined the potential suitable range under current and climate change conditions (+3^{o} C). The fourth phase in the establishment of an EDRR program requires a thorough understanding of the control methods that can effectively eradicate new incipient infestations. To achieve this, several groups in California have been working to develop appropriate management strategies, including Cal-IPC, the California Department of Food and Agriculture, the University of California (UC) Cooperative Extension, and member of the state Weed Management Areas. Much of this information is available on three primary websites associated with Cal-IPC, the UC Weed Research and Information Center, and the UC IPM program. Eventually, management options will be linked to the online diagnostic identification tool. Finally, a funding system must be in place to allow rapid response to new potentially damaging invasive plants. Legislative activity at both the state and national level are attempting to provide this funding source. While none of these phases are yet completed in California, all are now underway and may eventually lead to an effective EDRR program.

Establishment of a National early detection and rapid response programme - some early lessons

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With a budget of seven hundred million Rand (€63,000,000) allocated for management of invasive alien plants the South African government has shown that it takes the threat of invasive alien plants to environmental services and human livelihoods seriously. The management of invasive alien plants also has benefits in terms of job creation where unemployment is high. However, creation of jobs in management of invasive species is not necessarily the most cost effective way of managing the problem. Prevention of new species entering the country would be first prize. In the absence of prevention, Early Detection and possible eradication of new invasive plants may be more cost effective if efficient systems of early detection and successful eradications are achieved. The Working for Water programme in South Africa has devoted 1.43% of its budget to establish a National Early Detection System. This paper will explore the challenges and opportunities of setting up such a programme including: monitoring approaches, which species to target, engagement of stakeholders, staffing issues, institutional arrangements and political forces.

The NOBANIS gateway on invasive alien species and the development of a European Early Warning and Rapid Response System

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NOBANIS (the European Network on Invasive Alien Species) is a gateway to information on invasive alien species in Europe. Eighteen countries in North and Central Europe participate in the NOBANIS network, which originally was funded by the Nordic Council of Ministers (2003-2008), but is now funded by member countries.

The focus of NOBANIS is to provide information on IAS for environmental managers working with preventative measures, control and eradication of IAS in all environments. The NOBANIS gateway provides information on alien species and populations in distributed but integrated databases with more than 14,520 records, fact sheets on 59 of the most invasive alien species in the region, an identification key for alien species in the marine environment and a library on national regulations and literature. A charting function enables the user to produce figures from the databases for example trends in introduction, pathways of introduction, habitats invaded.

After a workshop on developing a European Early Warning and Rapid Response System in June 2010, the focus of work within NOBANIS is continued improvement of the databases and on developing the early warning aspects of the gateway. A quarterly newsletter is produced to facilitate exchange of information. A "species alert" function on the portal is under development. A pilot project has been initiated to implement a biogeographic approach in the databases to facilitate early warning functions in the future.

From mediocrity to notoriety - the case of invasive weedy rice (*Oryza sativa* L.) in Malaysian rice granaries

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Since its first reported occurrence in 1987 invasive weedy rice (*Oryza sativa* L.) aggregates are a scourge in the Malaysian rice granaries inflicting measurable decrease in the growth and yields of commercial rice. We collated and analysed field survey data on the extent of infestation of invasive weedy rices in the Malaysian rice granaries and augmented them with the experimental data on economic losses and economics of control in Peninsular Malaysia for the past 20 years. Albeit season-mediated fluxes with erratic infestations of the scourge from small pockets measuring less than 50 ha in total in Selangor North-West Project in 1987 to *ca.* 49,000 ha out of 230,000 of rice granaries occurred in Malaysia in 1997. The parallel figures of infestation for 2007, 2008 and 2009 were *ca.* 11,735ha, 32,370 ha and 56,790 ha, respectively. Different degrees of both season- and field-mediated infestations were displayed, ranging from <1% to >50%. With 35% field infestations of weedy rices, for example contributed to a density-mediated yield loss of 50-60%, or 3.20 - 3.84 tonnes/ha/season valued at MYR 4,800 – MYR 5,670/ha/season. Based on conservative estimates of 5% yield loss due to weedy rice infestation nationwide and the national average of 5 tonnes/ha, a yield loss of 0.25 tonnes/ha can be envisaged. This is translated into a monumental loss of 115,000 tonnes/year of rice yields valued at MYR172.5 million/year based on the government guaranteed price of MYR 1,500/ton. The average input and labour costs of thorough land preparation, herbicides and their application as well manual weeding, roughing and panicle slashing of weedy rices amount to MYR 650/ha or MYR 36.7 million nationwide. This management costs augmented with monumental yield loss affected not only on farmers' income but also the national target of self-sufficiency level of 90% by 2010. The socio-economic impacts and future trends are discussed.

Eradication and monitoring of Australian Acacias in South Africa as part of an EDRR program, can species with long-lived seed banks be eradicated?

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The South African National Programme for Early Detection and Rapid Response of Invasive Alien Plants was initiated in September 2008, with a 3-year funding commitment from the national government (through the Working for Water Programme). In the Western Cape (in essence the Mediterranean Region), a decision was taken to focus on several case-studies to demonstrate the effectiveness of this approach with a view to securing a longer-term funding comittment. In this talk I want to introduce the progress made, the species targetted, and some of the problems encountered. I will then focus more specifically on the initial results of work on Australian Wattles, in particular preliminary efforts to eradicate Acaia paradoxa from Table Mountain, and initial assessments of *Acacia implexa* and *Acacia stricta* as invasive species with currently restricted ranges but an undetermined risk of spread, and surveys conducted to find and assess other Australian acacia species found in South Africa.

"Eradication and monitoring of Australian Acacias in South Africa as part of an EDRR program, can species with long-lived seed banks be eradicated?"

One of the targets of the initial phase of the South African National Programme for Early Detection and Rapid Response of Invasive Alien Plants has been introduced wattles (Australian acacias). While 15 Australian Acacias are listed in South African regulations on invasive plants (NEM:BA), only eleven of these are widespread. The remaining four species (*A. adunca*, *A. implexa*, *A. paradoxa*, *A. stricta*) were recorded from less than four sites, but, before the EDRR program, these species had not been investigated in depth. In this talk I will discuss work towards the aim of EDRR's involvement in Australian Acacias: namely a) to implement an adaptive management programme on the *A. paradoxa* population on Table Mountain with the aim of eradication, b) to provide initial field and risk assessments for the other three listed species; c) to survey for other acacias that are potentially invasive but not listed; and d) to explore whether robust generalisations could be produced to identify future high risk species.

Should Melaleuca be an eradication target in South African fynbos? Looking beyond population data

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Predicting the behaviour of invasive species is one of the main challenges for researchers in invasion ecology. Anticipating species behaviour allows resource managers to make prudent decisions when assessing comparative risk between species, indicating which species should receive priority investment, as well as allowing for more strategically directed management action. In the context of early detection and eradication attempts, plant population data (biological attributes and spatial distribution) are typically collected as fast and as thoroughly as possible to provide a primary foundation for estimates of risk of spread and to inform treatment. Whilst such results are critical, the interpretation of data to predict population behaviour can be relevant only when viewed within a broader set of variables that account for how a population is behaving. This paper uses an example of *Melaleuca* species in South Africa, drawing on information from *Melaleuca* invasions in a mediterranean ecosystem (fynbos) in the Western Cape, South Africa. We show how the consideration of contextual aspects such as history of introduction, site history, history of species behaviour elsewhere, history of introduction and taxonomic records, enrich the approach for interpreting primary population data. Such considerations are expected to enhance understanding of the broader system variables that influence population behaviour within mediterranean fynbos. Finally we remark on how contextual information is likely to redirect, if at all, our assessments of invasiveness and risk of *Melaleuca* in South Africa from an early detection and eradication perspective.

Industry view on importance and advantages of a Code of Conduct on horticulture and invasive alien plants

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The International Association of Horticultural Producers (AIPH) represents horticultural producers' organisations all over the world. The horticultural industry supports the aim to preserve the biological diversity. The reinforcement of the biological diversity in urban areas, the improvement of the greening in cities is considered and supported as the essential aim of national strategies for biological diversity. Therefore AIPH has interest in the prevention of introduction and spread of invasive plants. Their interest is that a Code of Conduct is set up by the sector itself or in partnership with government and/or NGO's. A code may not just be layed upon the sector by the authorities. The rules have to be made by and in agreement with the target group. They also can agree on the sanctions, within ethical and legal boundaries.
Introducing a Code of Conduct can only be successful if there is awareness of the problem and stakeholders find it their responsibility to take preventive measures. The organisation that edits the Code of Conduct has to be representative for the sector. The form and the content have to be accessible, consistent, applicable, realistic and feasible.
To be effective a Code needs incentives, compliance and assurance. Major reasons to encourage self-regulations are 1) preventing government regulation, 2) concern for the image of the sector, 3) concern for the environment and 4) corporate social responsibility. Although Code of Conducts is not a new way of self-regulation, in the horticultural sector it is relatively new. Since the middle of the 90-ties codes of conduct or code of practice have been introduced in the field of environment and social aspects. Some Codes of Conduct or Code of Practice for preventing the spread of invasive plants have been introduced in the last few years. Other initiatives like Action Plans or Management Plans towards invasive species, edit by governments, are more compulsory.

Effectiveness of policies and strategies in tackling the impacts of Invasive Alien Species on biodiverse Mediterranean ecosystems in South-West Australia

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When policies, strategies and prioritization processes for invasive alien species (IAS) are based on individual species, whether it is at a global, regional or whole of country level, discrepancies can occur resulting in long term negative impacts on highly biodiverse ecosystems. The Convention on Biological Diversity (Bonn, 2008) invited Parties to consider the impacts of IAS on biodiversity, utilizing an ecosystem approach for specific biogeographical regions, and to focus on the restoration and rehabilitation of ecosystems degraded by the presence of IAS. Research organizations were called on to study the impact of IAS on socio-economic factors, health and the environment. Plant invasions in Mediterranean Regions of the world provide the opportunity to consider ecosystem impacts of invasive species with ecosystems the focus, rather than the invading species. Examples will be provided within woodland, coastal and wetland ecosystems in the South-West Australian mediterranean biodiversity hot spot, where financial assistance based on individual invasive species, of "national significance", has led to limited resources being directed to highly biodiverse ecosystems and consequent ecosystem decline. The Copenhagen Meeting on Climate Change (December 2009) identified the vulnerability of ecosystems to a changing climate and the importance of maintaining and increasing their resilience through good management, thus enhancing their climate mitigation potential via the sequestration and storage of carbon in healthy forests, wetlands and coastal ecosystems. In the examples provided the decline in the functioning of invaded biodiverse ecosystems will be demonstrated. Questions will be raised as to whether investment in invasive species research and management would be more effective for biodiversity protection if the strategies and policies directing investment were focused on the ecosystem approach rather than a single species approach. A diagrammatic representation, based on evidence based ecosystem research, will be presented outlining the limited potential to restore transformed invaded ecosystems without early intervention.

Combining methodologies to increase public awareness about invasive plants in Portugal

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People are one vector of introduction and spread of invasive alien species (IAS) and, on the other hand, can play a major role in helping to control invasive species. To achieve the sustainable management of IAS, it is important to promote awareness and understanding of this environmental threat among present day scientists and other professionals dealing with exotic species, but also for decision-makers and the general public. Even though IAS and their consequences have been recognised by the Portuguese law since 1999, this problem is still unknown to a large part of the Portuguese population. Aiming to survey the awareness of technical publics who deal with exotic plant species about invasive plant use and legislation, online inquiries were performed targeting public authorities, conservation experts, forestry associations, horticultural trade, etc. Results showed that unawareness about IAS, amongst these target-publics, is still high. Although there were some limitations, the results allowed the initiation the mapping of distribution of major invasive plants along the continental Portuguese territory. Furthermore, the inquiries allowed the evaluation of the knowledge of these publics about present legislation and invasive plants recognition. In addition they increased public awareness and nowadays many technicians contact us asking for information or consultation about management of invasive plants. In order to increase public awareness we have organized training courses for professionals dealing with exotic plants and for schoolteachers. Additionally, we developed a web page (www.ci.uc.pt/invasoras) about invasive plant species and produced printed documentation about "invasive plants in Portugal", including bookmarkers, postcards, one field guide, and a technical document about identification and control of invasive plant species, amongst other initiatives. Overall, public awareness is increasing, but much work has still to be done. We are diversifying the field actions, establishing protocols with local and regional administrative entities, and planning a pilot early-detection programme in the near future.

Outcomes of the Tunisian experience on farmer field school management of Silverleaf nightshade

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Silverleaf nightshade (*Solanum elaeagnifolium* Cav. # SOEL) is thought to be native to the South-Westem USA and Northern Mexico. It has spread to many arid regions of the world. The Food and Agriculture Organization of the United Nations (FAO) supported a regional programme (TCP/RAB/3102) on management of exotic invasive weeds, in particular SOEL. This programme was effective in Morocco and Tunisia from July 2008 to December 2009. Several options for management of SOEL have been evaluated in three Farmer Field Schools (FFSs) located at two heavily infested regions (Kairouan and Sidi Bouzid) and a recently infested one (Mahdia). FFSs involved about 75 farmers and technicians and an average of seven meetings/FFS. The treated subjects were:

- SOEL identification to prevent its establishment in non infested areas
- SOEL biology as a tool for its practical management
- Cultural and hand weeding options against SOEL
- Alfalfa ability to suppress SOEL
- SOEL control with herbicides
- Manure composting to kill SOEL seeds and prevent its spread.

These FFS were an occasion to enhance farmers' capacity to analyse SOEL control methods, identify their restrictions, test possible solutions and eventually adopt the most suitable practices. Several options have given adequate results. Therefore, it is evident that an integrated management approach will be needed against SOEL.

Legislative, biological and agronomic measures to comply with the Bern Convention recommendation n141/2009 on "Potentially invasive alien plants being used as biofuel crops" by Contracting Parties in the Mediterranean Basin

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Recently the Standing Committee of the Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), worried that the increase of biofuel cropping systems may lead to cultivation escapes of invasive taxa with subsequent negative effect on native biological diversity, adopted a recommendation (n. 141) for Contracting States on "Potentially invasive alien plants being used as biofuel crops". Loss of biodiversity, caused by escaped aggressive crops cultivars competing/crossbreeding with native species and causing impacts on natural habitats, is an important issue (together with food security, loss of soil fertility and land changes) to take into consideration to ensure sustainable bioenergy production. Several biofuel species, have traits in common with invasive species and may harm both the agroecosystems biodiversity (i.e. harming native hedgerows, semi-natural and remnant vegetation) and functionality (i.e. obstructing river channels or reducing the harvest yield). These crop species, being selected for broad ecological amplitude, rapid growth, high seed production, vegetative spread, resistance to pests and diseases are, in fact, potentially invasive. Furthermore, in farmlands habitat modification or degradation due to fragmentation, distorted water balance and nutrient cycle, altered fire regimes and abandonment of arable lands might contribute to the establishment of invasive taxa in new or temporarily "vacant niches". Planting massive quantities of vigorous plant varieties on a large scale by repeated introductions, in different climates and soil conditions increases the propagules pressure and likelihood of "crop escape", with subsequent, establishment of new biological invaders. This conference paper exemplifies which are the appropriate actions that Bern Convention Contracting Parties should undertake to be able to comply with recommendation n. 141. To reduce the potential risk of invasiveness (applying the precautionary principle) it is important to avoid the use of crops species which are already recognised as invasive elsewhere and to undertake a pre-cultivation screening on potential invasiveness for each proposed genotype and region. In addition the cropping system needs to consider the possibility of reducing propagules occurrence and dispersal even if this will effect agronomic and economic efficiency. Between the crop field and natural vegetation there is the need to interpose a buffer zone (i.e. made with non invasive crops) that acts as a biological barrier. The extension of the zone needs to be calibrated according to the invasiveness capacity of the crop. In addition, considering the fact that in the near future biofuel algae will be selected or engineered to increase photosynthetic efficiency, biomass productivity and survival in open ponds, farming and processing need to be undertaken in full containment in order to avoid any risk of environmental contamination.

Biomass crops in the Mediterranean: can experiments in Languedoc Roussillon help characterize the risk of invasiveness of the plants used?

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Increasing scarcity and cost of fossil fuels, related with the desire to reduce CO_2 emissions influence proactive policies promoting renewable energy in Europe.

Energy crops are part of the portfolio 'renewable energy' and are providing a secure and diversified supply of biomass that can be used for heating and power production.

The Languedoc-Roussillon is facing important changes in agriculture which led to the uprooting of vineyards and left some land uncultivated. The use of agricultural land to produce energy crops has resulted in various projects implementing production or experimentation plots that can test cultural practices developed in other climates to the Mediterranean constraints.

Exotic trees and shrubs are used in various soil and climatic conditions, mainly in short or very short rotation coppice, in order to find the desired species with high production potential that can withstand the long summer dry period and provide enough biomass to be economically viable despite harsh conditions.

As some plots are already established, it is considered useful to propose protocols for monitoring the biology of the exotic species that are used in order to characterize their potential risk to express invasive characters.

Management of alien plant invasions: the role of restoration - Insights from South Africa

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Restoration is an integral part of managing invasive alien plants. Many restoration projects focus almost exclusively on the removal of species that are considered to have "degraded" an ecosystem in some way. In many cases the removal of alien species is an important element in achieving other goals such as recovery of endangered species or repair of ecosystem function. However, in some cases, invasive species removal has become a goal in itself. Many restoration efforts have succeeded in mitigating negative impacts of invasive species, with important benefits. However, restoration efforts often have unforeseen consequences that exacerbate rather than mitigate the "problem" that triggered the restoration effort. An emerging problem relates to what happens in, or to, ecosystems once invasive species are removed. Invasions can cause long-lasting changes to the ecosystem that persist well after the removal of the invasive species. These so called 'legacy effects' can cause increasing problems for restoration following invasion. Another widespread problem is "secondary invasions" – the rapid replacement of the removed invasive species by others that capitalize on the disturbance caused by the control operations and/or resource alteration caused by the invasive species or the management intervention.
Invasive species management can also degrade ecosystems and negatively affect native species. In some cases alien species invade by infiltrating ecosystem networks, notably pollination and dispersal networks and food webs, where they forge novel functions. Removal of these alien species can cause trophic collapses. Restoration efforts can also be compromised by conflicts of interest, perhaps the best-known example being invasive alien *Tamarix* species providing habitat for endangered native bird species. Such examples point to the need for more careful consideration of all implications of planned control and restoration programs.
We present an overview of restoration insights from the Western Cape, South Africa. We conclude with recommendations for protocols tackling biological invasions in ecological restoration.

A large-scale project of invasive plant coenosis control in Mediterranean sand coastal area: two case studies and a model to standardize the management criteria

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Psammophilic coastal ecosystems are extremely limited in nature. In addition, they are also very selective for the species that live there. For these reasons the control of exotic invasive vegetation gives us a good opportunity to also consider effectiveness in a large scale area in respect to a cost-benefit framework. In this paper I analyze two case studies that concern 8 km of coastline with 80 ha of psammophilic vegetation. In this area there is a rich mosaic of phytocoenosis (13 habitats of conservation interest in regard to Habitat Directive definitions) where we have carried out a complex restoration project with the control of 6 ha of exotic coenosis of *Amorpha fruticosa* in the inter-dune wet habitat and the control of over 280 patches of *Yucca gloriosa* scattered in the dune xeric habitat. A monitoring program before and post intervention shows us the changes with respect to the hydrogeological and biological environment. Finally, I discuss the ecosystem benefits in a local and in a strategic view and I analyze the technique and the financial constraints to model and understand the key parameters and criteria to reduce errors and enhance the effectiveness when we plan this kind of intervention.

Three tools to manage exotic weeds in Swiss agricultural and non agricultural environments - a proposal

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Information on exotic weed species interfering in agricultural and non agricultural zones is manifold, but always focussed on a certain objective and a certain background. Information, provided in leaflets for instance, is likely to be inadequate to provide the precise information the readers require. General guidelines are needed to concentrate financial and human resources on environmental weed control to real problems, such as risk to public health or damage to infrastructure, caused by weeds.

Three elements – a collection of 'weak point sheets' for noxious endemic and invasive alien weed species, a list of costs for control methods and a list of restrictions for use of control methods in environmental zones, the latter adapted to a country – would allow any functionary in any region to choose adequate control methods.
Practical tools for an information concept on control of invasive and other noxious plant species are proposed. Tool one is one sheet per species containing an exact description of the 'weak point' in the life cycle of the species. A simple and general description of control possibilities targeting the weak point, consequences of incomplete control and the necessity of after-treatment must be mentioned; but no figures and no further details are found on the sheet. A collection of sheets would represent all species relevant for a certain region or country. Tool two is a list containing of details on costs of machines, labour and additional efforts for control methods. This must be adapted to a countries situation, and it must be updated regularly. Tool three is a list containing detailed information on restrictions – adapted to a region or country – for use of herbicides or other control methods in all existing zones like water surface, waterways, forest, traffic routes, public and private green, agriculture and horticulture, industrial and residential zones, unproductive zones in mountain areas and others.

Biology and control of the invasive weed *Heterothera subaxillaris* (camphorweed)

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Heterotheca subaxillaris (camphorweed) is a dicotyledonous winter annual weed of the Asteraceae (Compositae) family, a native of North America. The plant invaded Israel during the last 20 years occupying a wide range of habitats, rapidly infesting cultivated and non-cultivated ecosystems such as orchards, nature resorts, range land, open fields, waste ground, roadsides and railroad embankments. We found that optimum germination occurs at 28/22°C (day/night) in both light and dark conditions, but high germination rates were recorded even at 34/28°C. Highest emergence (88%) was recorded when seeds were sown at a shallow depth (0 –1cm) in sandy soil. However, less than half of the seeds emerged from a shallow depth (0-1 cm) in the heavy (clay) soil while no seedlings emerged from deeper layers. *H. subaxillaris* is very sensitive to herbicides commonly applied in roadside and non-cultivated areas such as atrazine, diuron, sulfometuron and imazapyr (at the recommended rate = X). In addition, trifloxysulfuron, imazapyr and fluroxypyr applied post-emergence effectively controlled young seedlings (4 to 6 leaves stage), whereas paraquat+diquat, glyphosate and fomesafen were less effective and the injured plants recovered few weeks after treatment. No control of *H. subaxillaris* was observed when oxyfluorfen was applied post-emergence at 4X. Our results indicate that *H. subaxillaris* can be managed with the existing pre- and post-emergence herbicides.

Mesquite (*Prosopis juliflora*): A threat to agriculture and pastoralism in Sudan

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Common mesquite (*Prosopis juliflora* (Swartz) DC) is a multi-purpose ever green leguminous tree native to the Americas. The tree was introduced into the Sudan in 1917 to combat desertification. Successful establishment and ability to fix sand dunes, reduce wind speed and evaporation promoted further introductions in 1928, 1938, 1947, 1965, 1966 into Central, Western, Eastern and Northern Sudan. The drought of the 1970s rejuvenated interest in the tree and further introductions were made. The tree was planted as shelterbelts around towns, cities and agricultural schemes in areas threatened by desertification. Deliberate distribution within the country, prevailing drought, decreased land-use, land tenure, under utilization, mismanagement and over exploitation of natural vegetations coupled with copious seed production, prolonged seed dormancy adaptations to endozoochory and spread by water, self incompatibility, extensive root system, rapid growth and regeneration by coppicing together with the suppressive effects on natural vegetations enhanced rampant invasion and fostered colonization of a wide range of habitats. Currently mesquite has invaded both natural and managed habitats, watercourses, flood plains, highways, degraded abandoned lands and irrigated areas. The area under mesquite is estimated to be over one million hectares with the bulk in Eastern Sudan, where livestock and subsistence farming constitute the main source of income. Several efforts have been made to eradicate mesquite. However, because of high cost and complexity of the problem, most of the efforts were not successful or sustainable. In 1995 the government approved a bill on mesquite management. The tree is to be eradicated where it constitutes a threat to agriculture or biodiversity and preserved in areas threatened by desertification. Currently a research programme with the objective of development of sustainable site specific mesquite management strategies focusing on eradication of satellite foci, containment of founder populations, and utilization is ongoing.

Is bio control of *Ambrosia* spp. with *Epiblema strenuana* found in Israel possible?

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Several new species of Ambrosia were found in Israel during the last years. *Ambrosia maritima* L. is the only species of this genus present in the Israeli flora. *A. trifida* and *A. artemisifolia* were found in the Northern Galilee in a feeding birds (Cranes) migration field with corn grains imported from the USA. Another species of Ambrosia was found in the central regions of the country. *A. confertiflora* was found in the Heffer valley area along the Alexander river banks spreading in a nature reserve area, sub-tropic orchards and affecting farmers' incomes and biodiversity. An update survey carried out in summer 2007 indicates that this species was introduced to Heffer valley from Nablus (Palestine authority) via sewage and rainfall water which ran downhill towards the Alexander River. More recently we found other populations of the weed far away from the initial growing areas probably introduced by agri-machinary or transfer of soils. Another species, *A. tenuifolia* was found North-West of the Heffer valley exhibit supreme adaptation to the places invaded. Like *A. confertiflora* this weed produces underground rhizomes and seeds. Both, *A. confertiflora* and *A. tenuifolia* are hard to kill, perennial noxious weeds and extreme rates of non selective herbicides like 2,4-D, fluroxypyr and glyphosate are needed to manage them. During a survey carried out in summer 2008 a few larvae of the stem galling moth were found in the small population of *A. tenuifolia* indicating that this moth was introduced to Israel sometime earlier. A survey carried out in summer 2009 reveals the "good" news of finding this moth on *A. confertiflora* plants too. The Australian experience using such bio control agent against these types of invasive weeds will serve the Israeli P.P.I.S authorities as a base for starting a program using *Epiblema strenuana* as bio control agent.

Abstracts of posters

Lists of invasive alien plants (IAPs) as a key issue/tool in effective management of invasive non-native species

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Lists of invasive alien species (IAS) are considered as a key issue and tool for effective management of the invasive non-native species in a region (country). They are used for early warning, monitoring, eradication and control, education and communication at local, regional and global scales. Lists are usually declared by Act and/or Directive (national legislation, international conventions) and are used as official documents for management activities in a country/region/globe. The lists are composed of non-native (alien) species that behave invasively in a region, this is to say that they rapidly increase the area they occupy (expansion), they establish local populations and form metapopulations in new environments, they penetrate into semi-natural and natural communities (habitats), and they form mono-dominant dense stands and suppress native species.
The comparison of lists of IAPs in neighbouring European countries have shown that large differences in number of listed species found (from 27 to 79) can be caused not by ecological and socio-economic conditions in the countries but predominantly by differences in definition and criteria used for identification and categorisation of the invasive non-native species. Serious negative impacts on native biodiversity and/or economic losses as criteria of invasiveness are also the subject of scientific discussion. The differences can be due to different levels of knowledge about the status and distribution of non-native species, ways of list preparation and subjectivity of experts opinion. In this task, therefore, the lists have to be based on continuous field research of invasive behaviour of the aliens and not only on simple inventories and/or compilation of current floristic/faunistic data. Several invasive status categories can be distinguished – invasive, transformer, potentially invasive, regionally invasive and post-invasive species. Scientific research of invasive behaviour of non-native species and invasion process are needed to collect data for quantitative criteria of invasiveness and for better understanding of the ecological process.
The lists have to be updated in a 5 to 10 year periods by re-assessment of non-native species due to high dynamics of the process of invasions and changes in landscape. The legislation process delay can support spread of many invasive non-native species and limit financial resources for eradication, more intensive monitoring, early warning and control, as well as other instruments used in environmental management.
The lists are an important tool for communication with policy makers, planners, managers of natural resources, stakeholders, land owners, public, increasing their interest in invasive non-native species management, providing the up-dated information on invasive non-native species.

Some invasive plants in the Western Black Sea region of Turkey and their monitoring possibilities

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In this study, information about the distribution of some invasive plants such as *Abutilon theophrastii* Medik., *Ailanthus altissima* (Miller) Swingle, *Ambrossia elatior* L., *Amorpha fruticosa* L., *Conyza canadensis* (L.) Cronquist, *Rosa mutiflora* Thumb., *Lavetera arborea* L., *Opuntia ficus- indica* (L.) Miller, *Phytolacca americana* L., in the Western Black Sea Region of Turkey has been undertaken. *Ambrosia elatior, Abutilon theophrastii, Amorpha fruticosa, Lavetera arborea* were found as a new record for Düzce Region and deposited at the DUOF herbarium. As a result of our observations, it was found that these plants could be invasive and naturalised in the near future. We discuss their monitoring possibilities with pollen data and land observations in Western Black Sea Region.

Alien Plant Species in the Western Part of Turkey: Assessing their Invasiveness Status

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The flora of the Mediterranean Basin contains ~ 24 000 plant species in a surface area of about 2.3 million km ^{2}, that is 10% of known plant species in a small area; In contrast, non Mediterranean Europe covers about 9 million km^2 but has only around 6 000 plant species.
According to the Flora of Turkey, more than 9 000 species occur in the country of which approximately 1.5% are alien species.
The Mediterranean type climate region of Turkey also has a very rich flora. In spite of, or due to, flora species richness many alien plants native from South Africa, Central and South America and North America occur in the region. For many species, however, the invasiveness status is unknown.
This paper deals with the ecological features, occupancy and distribution of alien plants occurring in the Mediterranean Western part of Turkey (Western Anatolia). It is also an attempt to review the status of the alien plant species in order to assess the invasiveness, the stage in the invasive process, and the degree of naturalization of those species.

Invasive plants in Armenia (current situation)

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Until the present time the problem of invasive species was given practically no attention in Armenia. The main reason for the lack of studies of invasive plant species was underestimation of this problem by the scientific community and governmental structures. It was considered that due to the mountainous and indented landscape and absence of big plain territories invasive species could not greatly harm the natural flora and vegetation of the Republic. Thanks to our efforts the attitude towards the problem of invasive species in Armenia has changed. In 2005, research on invasive species was supported by governmental funding, and we started to collect data on the spread of invasive species, their ecological characteristics and level of penetration into natural ecosystems.
Now the preliminary list of invasive and expansive plant species has been prepared. It includes more than 110 species and contains both species known as invasive in other regions of the world and new plant species recently found in the republic, as well as registered indigenous expansive species.

The species of most concern is currently an alien tree *Ailanthus altissima*, which is spreading in natural ecosystems of the North and South of Armenia, as well as in disturbed ecosystems of the central part of the country. *Robinia pseudoacacia* penetrates into natural ecosystems rather intensively in North Armenia. *Silybum marianum* is very intensively spread in North and South Armenia and needs constant control where it is present. Other species that occur only occasionally (*Ambrosia artemisifolia, Galinsoga parviflora, Galinsoga ciliata, Sphaerophysa salsula*, etc.) require constant control of their spread. However, indigenous expansive species (*Astragalus galegiformis*, different *Cirsium, Carduus, Onopordum, Leucanthemum, Tripleurospermum* species, *Cardaria draba, Cardaria boissieri, Geranium tuberosum* and many others), especially those growing plentifully in abandoned fields, require most attention, as they form reserves of seed and penetrate into natural ecosystems.

Invasive aquatic plants in the French Mediterranean area

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Since January 2009, a National Working Group on Biological Invasions in Aquatic Ecosystems (WG BIAE) has been created in France, bringing together researchers, institutionals and managers.
Among the group's work, a survey was designed on IAS (Invasive Alien Species) of flora and fauna in aquatic environments and their management in metropolitan France with the objective of achieving a synthesis and sharing of management actions and results, to enable exchanges between managers and, in the longer term, to achieve a distribution map of species and management actions at the national scale.
To reach this objective, the survey questionnaire aimed at determining the alien species present in the environment, at defining the type of environments colonized, at assessing their impacts and at managing these species.
A first analysis of the results shows that with 9 answers in Languedoc-Roussillon, 10 in Provence-Alpes-Côte d'Azur and 2 in Corsica, the French Mediterranean region accounts for 8% of responses received to date. The presence of 11 plant species out of 18 proposed in the questionnaire has been mentioned. The species most cited are the Water primrose (*Ludwigia sp.*) and the Black locust (*Robinia pseudoacacia*).
More detailed information on the impacts or management of these species were provided for 7 of the 11 species listed. The management methods are given for 6 of these 7 species and the most frequently used are removal by hand and mechanical harvesting. In addition, 7 other plant species not part of the list were cited. The results on the costs of intervention were also roughly analyzed.
A comparison of these data with the overall results showed that, for aquatic plants, this region does not really stand out from the rest of the metropolitan area.

The inventory of the alien flora of Crete (Greece)

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The island of Crete (8,729 km^2) lying between Greece and Libya, is the most southerly region of Greece and Europe. Relatively high mountains dominate the rugged landscape, the climate is typically Mediterranean where mean annual rainfall decreases from west to east and from north to south, but increases with altitude. The Mediterranean basin region has been subject to human intervention for millennia, so that little remains of native natural ecosystems, especially in the coastal area, where urban and tourism pressure are remarkable severe. Yet the region in general and Crete in particular, is still an important biological resource for native phytodiversity.

The aim of this study, started in 2005 and presently in progress, is to carry out the first comprehensive inventory of the alien flora of Crete and distribution mapping of the main invasive alien species. Data from literature and field observations were used to develop a preliminary information database for the inventory that includes, so far, 272 alien taxa, 85 of which are naturalized, 51 are casual and 21 are considered invasive. The woody component comprises 142 species of trees, shrubs and sub-shrubs, woody vine and succulent. For each species the following information has been collected: origin, status, distribution, life form, phenology, habitat preferences, altitudinal range and introduction pathway.

Mapping data has been stored in a geodatabase using GIS software, and preliminary analysis of the main features of the Crete alien flora is herewith presented. The most abundant and invasive alien species in Crete are *Oxalis pes-caprae*, *Ailanthus altissima*, *Robinia pseudoacacia*, *Carpobrotus edulis*, *Nicotiana glauca* and *Ricinus communis*.

Cactaceae naturalized in the Italian Mediterranean region

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The Mediterranean region has recently been interested by the invasion of new *taxa* of the Cactaceae family. Climate change, horticulture and deliberate introduction site in the urban-wild interface are the principal drivers of this phenomenon. A revision and updating of the previous published Catalogue of the Cactaceae naturalized in Italy is now published and presented here. Two new genera (*Cereus*, *Mammillaria*) and five new species (*Cereus hildmannianus*, *Cylindropuntia spinosior*, *Mammillaria bocasana*, *M. elongata* and *M. polythele*) are recorded for the first time and illustrated for Italy. Noteworthy, species of the genus *Mammillaria* are recognized for the first time as naturalized in Europe. A total of 26 *taxa* belonging to 8 genera have been recorded in the Mediterranean region of Italy.

Comparison of the exotic vascular flora in continental islands: Sardinia (Italy) and Balearic Islands (Spain)

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This paper provides a comparison of the vascular exotic flora of the island of Sardinia and that of the Balearic Islands, both territories belonging to the Western Mediterranean biogeographic subregion. The study has recorded 531 exotic taxa in Sardinia (18.8% of the total flora) while 360 (19%) were recorded in the Balearic Islands; 10 are new to Sardinia (3 for Italy) and 29 are new for the Balearic Islands. The alien flora of Sardinia is included in 99 families; Fabaceae is the richest (49 taxa), followed by Poaceae (33) and Asteraceae (31) while in the Balearic Islands the alien flora is included in 90 families, with a predominance of Fabaceae (32), Asteraceae (31) and Poaceae (27). The comparison of the biological spectrum reveals that in Sardinia phanerophytes are the most represented, while therophytes are the most represented in the Balearic Islands. A detailed analysis shows that many of the exotic taxa (246) are shared by both territories with a clear dominance of neophytes rather than archaeophytes. A study of the geographical origin shows supremacy of the American element over the Mediterranean. The most occupied habitats are the semi-natural, agricultural and synanthropic for both territories, but for invasive plants, coastal habitats in Sardinia and wetlands in the Balearic Islands are the most sensitive. An important part of the work deals with the causes of fragility and low resilience of the different habitats. Further analyses have been undertaken to compare the densities of exotic species per area unit between Sardinia, the Balearic Islands and other continental and oceanic islands.

Is it the analogue nature of species which enables their successful invasion in woodland and coastal ecosystems of the southwest Australian Mediterranean biodiversity hotspot?

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An analogue species will be defined as an invasive species which mimics, to some extent the resident native species. The potential causes for the successful invasion of two analogue species, in different ecosystems i.e. woodland and coastal in the Mediterranean biodiversity hotspot of southwestern Australia will be investigated. Investigations have been conducted between the resident woodland species *Austrostipa flavescens* and the invasive *Ehrharta calycina* and the coastal *Acacia rostellifera* with the invasive *Retama raetam*. All native and invasive species are perennial, a trait of 75% of the resident native species. A comparison of seed biology traits between the analogue and native species has been made. We will provide preliminary data to determine if in fact it is the analogue nature, which has enabled them to establish in their new Mediterranean environment, with the differences in seed production and germination enabling them to be come invasive.

Alien plants in cotton fields and their impact on Flora in Turkey

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Cotton is one of the most important crops in Turkey. Weeds are among the factors which interfere with cotton production. Some alien plants such as *Amaranthus* spp., *Conyza* spp, and *Physalis* spp. as well as native ones such as *Sorghum halepense* create problems in cotton fields. In addition these weeds are a problem in the other summer crops and orchards. Turkey is like a small continent for biodiversity as it has three bio-geographic zones (Europe-Siberia, Mediterranean and Irano Turanian) and transitions, and it also serves as a bridge among continents with big variations in climate and geographic features within a short time span which helps Turkey to be an important source of biodiversity. The flora of Turkey has more than 10 000 species of which 1/3 of them are endangered. Turkey is also a main source of genetic material and species richness for the whole world. Invasive species are a main threat to the biodiversity. There are no works on invasive species in Turkey.
In this presentation we will use *Physalis* species which were recently introduced to our country and cause major problems in the fields. Only one *Physalis* species was listed in the flora of Turkey (*P. alkekengi*). Previous surveys performed in cotton fields did not report this species. However, surveys after 1990 showed that *P. angulata*, *P. philedalphica* var. *immaculata* ve *P. lanceifolia* are most abundant and widespread species in cotton fields. This study will focus on Phyaslis species to show invasive alien plants are a problem in arable areas explaining possible introduction/spread ways and possible measures.

Some Invasive Weeds in Turkey: *Diplachnea fusca* (L.) P. Beauv., *Chondrilla juncea* L., *Bromus* spp.

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Chondrilla juncea L. grows naturally in the edges of fields and gardens in Turkey and in many European Countries. However, this plant has been known as invasive weed in Australia and has been causing serious problem since 1970 in wheat fields. *Puccinia chondirilla,* which is the natural enemy of *C. Juncea,* is widespread in Turkey and European Countries. The introduction of the *P. chondirilla* to Australia allowed an efficient biological control of *C. Juncea.* Biological control has been made successfully since its introduction. The aquatic plant, *Diphlachne fusca* (L.) P. Beauv. was introduced into Turkey in the year 2003 and has been recorded as invasive in rice fields. It is spreading every year. There is no record of its presence in the Flora of Turkey dated 1975. The genuses of *Avena, Phalaris, Alopecurus* and *Lolium* have always been considered the most important monocotyledon weeds in wheat fields in Turkey. In recent years, *Bromus* spp. grown at the edges of the fields has begun causing damage in wheat fields. *Bromus tectorum* L. and *Bromus japanicus* Thunb. were found as two important weeds species. These two species have been reported as invasive plants. For the control of these invasive plants the sulfosulfuron, proxycarbazon-sodium+mezosulfuron methyl-sodium herbicides have been recently preferred. The excessive weed control practices damaging the natural flora and weed transmission between countries have resulted in the adaptation of new weeds to the new areas and subsequently weed invasion of fields.

Some Important Invasive Plants Belonging to the *Asteracea* Family in Turkey

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In this study, the origins, introductions, infestations and problems caused by *Centaurea, Cirsium* and *Onopordum* genera belonging to *Asteracea* family are discussed. *Centaurea diffusa* Lam. (diffuse knapweed), *Centaurea solstitialis* L. (yellow starthistle), *Cirsium arvense* (L.) Scop. (Canada thistle) and *Onopordum acanthium* L. (cotton thistle) are important invasive weeds for Turkey. These species originate from Europe and spread from this origin to other countries. *C. diffusa* is widespread in the Western part of North America, the Balkans, Ukraine, Russia. In Turkey, the species is generally seen in the Marmara Region. In USA, it is the main problem in alfalfa. This plant is mainly seen on roadsides, pastures and uncultivated land. *C. solstitialis* is introduced to Africa, Asia, West and Central America from Europe. It is found in almost all regions of our country and causes damage in meadow-pasture and uncultivated land. *C. arvense* is seen in the Caucasus, Iran, Afghanistan, North Asia, North America and in the whole of Turkey. This plant can cause yield reduction in cereals, maize, sugar beet, potatoes, sunflowers, legumes, vegetables gardens, fruit orchards, meadows, pastures and forage crops. *O. acanthium* was spread to Central Asia and North America from Europe. In Turkey, it is seen in Eastern, Northern and Southern Anatolia, mainly in roadsides and cultivated areas. These plants, belonging to the *Asteraceae* family, have spread between countries and have been creating important problems in the introduced areas. These plants were originally introduced from Europe and gained considerable attention as invasive weeds of agricultural and non-agricultural areas.

Some Invasive Obligate Parasitic Plants: *Cuscuta* spp., *Orobanche* spp., *Phelipanche* spp.

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Cuscuta, Orobanche and *Phelipanche* are important parasitic plant genera that cause problems worldwide. This presentation discusses their origins, introductions, infestations and problems caused, illustrated with some examples.
Cuscuta campestris Yuncker originates from North America and infests over 40 plant species such as sugar beet, pepper, onion, and alfalfa worldwide including Turkey. It has not been seen in the years up to 1925 in Turkey and might have been introduced in the 1940s.
Cuscuta approximata Bab. is a native plant of Mediterranean and Central Asia and creates problem in alfalfa fields in Turkey, it occurs in 12 states of the United States.
Cuscuta planiflora Ten. shows similarity regarding native and non-native range as *C. approximata*.
Orobanche spp and *Phelipanche* spp are problem in many crops such as tomato, tobacco, sunflower, lentil and faba bean in Mediterranean countries which represents their native range. They are known as invasive and problematic in California, Illinois, Kentucky, North Carolina, New Jersey and Texas in the USA. It is concluded that parasitic plants are also invasive species and create problems in introduced areas as well their native places.

Some invasive weeds in cereal areas of Northern Cyprus: *Oxalis pes-caprae* L. and *Gladiolus italicus* Mill.

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There are 69.2 thousands hectares of agricultural area of which 89% is under dryland farming, in the Turkish Republic of Northern Cyprus. Cereals cover 60 % of the agricultural area. Barley is the main cereal, representing 92% of the production. Two common weeds from barley fields will be discussed in this presentation: *Gladiolus Italicus* and *Oxalis pes-caprae*.

G. italicus is a perennial plant of Eurasian origin. Its pink blossom, which occurs in February and March, is its most noticeable character. The plant can reach up to 1 m high. It is common in barley fields in Carpaea Region which is one of the rainy parts of Cyprus. Its Turkish name is "arpa otu" which means literally "barley's weed".

O. pes-caprae is a South African geophyte which spreads vegetatively by bulbils and underground shoots, and easily colonizes many areas. It has been introduced into many Mediterranean and temperate regions of the world. It has spread in many islands. Similarly to *G. italicus*, it is common in the Carpea region. It does not let other plants grow around it and invades a whole field. It is observed that another common weed of the region, *Sinapis alba* cannot spread in the same field infested by O. *pes-carpae*.

Validation and use of the Australian Weed Risk Assessment in Mediterranean Italy

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A biological invasion is always an irreversible process which often leads to ecological and economic harm. The capacity to pre-screen potential invasiveness of plant species is, consequently, important for the conservation and management of natural habitats, especially within agro-ecosystems. In this type of anthropogenic manipulated ecosystem, many factors increase the creation of newly available niches. As a consequence, the presence and establishment of invasive species with the potential to spread and cause harm, or constrain elements of semi-natural habitat or vegetation remnants, may increase. The invasiveness of weedy germplasm may also be accelerated by the propagule pressure of cultivated species that are able to escape from fields through crop movement or on livestock. The future use of agricultural land for widespread and intensive cultivation of biofuel crops for energy production increases the need for a pre-entry screening tool both for species that are new to the Italian cropping system and for the management of existing weedy species. This study aimed to assess the effectiveness of adapting the Australian and New Zealand Weed Risk Assessment (WRA) to the geographic, climatic and weed management context of Italy. We evaluated the performance of the adapted WRA on several alien plant species of known invasiveness in Mediterranean Central Italy. WRA score results were compared with a priori independent opinions of botanists with field experience in the evaluated region. The assessment procedure correctly identified 93% of invasive species and 75% of non-invasive species. Further evaluation was needed for 20% of the tested species and was conducted through a secondary screening. Throughout the whole process, only one (5%) of the investigated species could not be assessed. The results of the Receiver Operating Characteristic analysis, the consistency of the outcomes with those found in other WRA studies, the Chi Square testing categories and the high correlation between the a priori and WRA score corroborated the predictive accuracy of the WRA for determining invasive from non-invasive species. This confirmed the effectiveness of the screening process and an assessment was subsequently carried out on proposed biofuel species detecting some potential invaders. The WRA can thus be used to assess the introduction of new cropping systems and for weed management.

A proposal for a cooperation program on modeling the spread of invasive weeds

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Evidence of northern spread of *Solanum eleagnifolium* and *Echhornia crassipes* in Syria is certainly a marker of the global warming effect. A few casual occurrences are also noticed in the Mediterranean area in France. It is likely that the distribution of these weeds will continue to progress northward. Since there are few efficient control methods, preventive actions where the weeds are not yet established seems to be the best way to manage the threat. Consequently, monitoring the habitats which are prone to the entry and establishment of these weeds, as well as sensitive habitats with threatened species or plant communities, is the only but urgent measure that countries of the northern border of the Mediterranean Sea must set up. Ecological and biological characteristics drawn from the experience and knowledge of countries where the invasive weeds are already present and continue to occupy new areas can provide suitable data to model the favorable habitats and the endangered areas. More precise measurements of certain key aspects of the life cycle should improve current available models. Reciprocally, such predictive models can provide new insights into the possible management of habitats allowing better control of the invasive weeds. The eco-climatic conditions in Syria and the South of France fit the described situation and provide the opportunity to launch a bilateral cooperative program on this topic. We invite all colleagues from any countries to join us and to propose a more global program.

Impact of *Humulus japonicus* on riparian communities in the south of France

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Japanese hop (*Humulus japonicus* Sieb. et Zucc., syn. *H. scandens* Lour. Merrill) is an annual fast-growing vine, native to deciduous forests of East Asia (Japan, China, Korea, Russian Far East). It was introduced to Europe in 1886 for ornamental purposes. So far, its naturalisation was only known from Hungary, North Italy and Slovenia. In France, the plant was observed for the first time in 2004 in a riparian habitat near the Gard river (south of France).
In Hungary, dense stands are reported to endanger the vegetation along rivers. Since precise data on impacts were lacking, vegetation in invaded and uninvaded plots with similar site conditions was sampled. In stands of *H. japonicus* mean species richness per m^2 only reached 3.63 (range: 0-6). In comparison, non-invaded neighbouring areas contained an average of 9.33 species per m^2 (range: 5-14). The most frequent species associated with *H. japonicus* were *Chenopodium album*, *Galium aparine* and *Rumex obtusifolius*.
We observed a high competitive ability of *H. japonicus*: even tall species such as *Sorghum halepense* or *Arundo donax* were bent under the load of its thick, heavy and shady mesh. Only two species: *Parthenocissus inserta* and *Cucubalus baccifer*, with a similar biological life form (climbing stems) were observed at high coverage with *H. japonicus*.
If species richness is reduced by 60%, the invaded communities do not present a high floristic interest as they are mostly composed of ruderal and nitrophilous species (*Atriplex prostrata*, *Torilis arvensis*), or other invasive species (*Ambrosia artemisiifolia*, *Artemisia verlotiorum*, *Helianthus tuberosus*). Moreover, *H. japonicus* forms an important litter that can modify the substrate for many years. The potential impact of this species on other riparian communities should therefore not be overlooked. Finally, it should be remembered that the pollen of *H. japonicus* is allergenic and could provoke health problems.

Allelopathic effects of *Oxalis pes-caprea* L. on winter cereal crops

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Native to Southern Africa, *Oxalis pes-caprea* L. (= *O. Cernua* Thumb., Oxalidaceae) is an invasive weed widespread in areas of the world with Mediterranean climate. It is a perennial bulbaceous and rhizomatous dicotyledonous species which reproduces asexually by bulbils. In Morocco, this species was introduced in the beginning of the nineteenth century. It was regarded as a naturalized species and occurred in gardens and along roadsides and edges of cultivated lands. Currently, it is infesting agricultural ecosystems. Based on ecological processes, resources use mechanisms (resource competition, resource utilization and allelopathy) is one of the plant invasion mechanisms.
A study was conducted in order to investigate the effects of aqueous extracts and leachates of *O. pes-caprea* on seed germination and growth of three winter small grain cereal crops (soft wheat, durum wheat and barley) and the phytotoxicity of its residues incorporated in the soil. At vegetative and flowering growth stages of *O. pes caprea,* both fresh and dried shoot and roots aqueous extracts significantly reduced germination of the three cereal crops seeds grown in Petri dishes. In addition, these extracts also decreased length and biomass of cereal crops roots and coleoptiles. Leachates had less inhibitory effects on germination and growth of the three cereals crops. The effect depends on cereal species, organs and growth stage of the weed. The inhibitory effect of extract and leachates was more pronounced at full strength concentration. Incorporation of dried shoot residues of *O. pes- caprea,* either at vegetative or flowering stages, in soil did inhibit seed germination, length and biomass of cereal crops roots and coleoptiles grown in pots. The maximum effect was observed when 36 g/Kg of resides were mixed with soil.

Fitness of the populations of invasive volunteer sunflower

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Fitness or organism capability to sustain itself, survive and reproduce is the main reason for the spread of invasive weed species in an ecosystem. In Serbia, in agricultural areas, edges of crop fields, uncultivated areas, and along roadsides we see more and more populations of volunteer sunflower (*Helianthus annuus* ruderale). This species is acting as an aggressive and invasive weed whose numbers are increasing from year to year and present problems in certain crops e.g. hybrid sunflower. To be able to estimate survival and spread it is important to study fitness: reproductive (vegetative and sexual) and competitive capability, possibility for hybridization, seed germination, and other physiological and genetic characteristics as indicators of capacity for spreading under conditions where herbicides were and were not applied.

In this experiment we studied three different populations of volunteer sunflower under field vs. controlled conditions and with and without application of herbicide nicosulfuron. Two populations originated from areas where herbicides ALS-inhibitors were used for many years (P_1 and P_2) and the third population originated from areas where herbicides have not been applied (P_3). The following parameters were evaluated: plant height, fresh weight, leaf surface area, anatomical characteristics, effects to increasing nicosulfuron rates, amount of chlorophyll, activity of ALS enzymes *in vitro*, seed germination, yield and yield parameters.

In general, population fitness depended on the year in which the sampling was conducted and was better with presumably resistant populations (P_1 and P_2) vs. susceptible population (P_3) for larger numbers of evaluated parameters (fresh weight, leaf surface area, amount of chlorophyll, yield parameters, seed germination, activity of ALS enzymes *in vitro*) under conditions without nicosulfuron and when nicosulfuron was applied (height, fresh weight, leaf surface area, amount of chlorophyll, seed germination, leaf anatomical characteristics).

In summary, relative fitness of different populations (susceptible and presumably resistant populations) of volunteer sunflower under conditions w/o herbicide applications is one of the most important factors which influence its survival and spread as an invasive weed species in an ecosystem. Our strategies for prevention of spread of volunteer sunflower need to be developed according to fitness.

Nicotina glauca Graham: an invasive with harmful potential

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In recent years *Nicotiana glauca* Graham has spread considerably throughout the Mediterranean and has even been recorded recently in ruderal situations in Southern England. Regular fieldwork in Spain and Morocco has enabled us to undertake projects and obtain detailed observations.
The species is native to Argentina and Bolivia where it is hummingbird pollinated. However, the breeding system has changed allowing regular high seed production in its well naturalized regions of Europe, North Africa, North America, Australia and New Zealand. This, in association with its ability to colonise dry watercourses, allows it to spread rapidly in frost-free drier regions. The temperature of the leaves indicates a high transpiration rate demonstrating the plant's ability to obtain water, even in semi-arid conditions coupled with a very high photosynthetic rate, characteristic of such nitrophilous invasive species. Additionally, it is a vigorous resprouter if cut back, and accumulates anabasine, a highly poisonous alkaloid, giving protection against most herbivores, although remarkably not a deterrent to a narrow range of caterpillars, whitefly and molluscs. Very recently we have seen it infected by tobacco mosaic virus, making it a potential danger to locally cultivated tomato, aubergine and pepper crops, as well as the cucurbits, also well known as susceptible to this pathogen.
However, websites show some seed suppliers offering innocent amateur gardeners an opportunity to grow and evaluate the species for ornamental horticulture. The continued spread of this species must be checked in order to preserve native habitats and protect economically important crop production.

Tree of heaven (*Ailanthus altissima* (Mill.) Swingle) – Colonization in Croatia

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Tree of heaven (*Ailanthus altissima* (Mill.) Swingle, family Simaroubaceae, order Sapindales) is a deciduous tree native to China. It was introduced into Europe in the late 1700s as an ornamental species. Nowadays, it is distributed in warm climatic areas of the world.

Ailanthus altissima (Mill.) Swingle is one of species listed on the EPPO List of invasive alien plants. It grows quickly and can reach a height of 2.5 m in its first year. It can grow rapidly up to 35 m, while its trunk can reach more than 1 (1.5) m in diameter. The bark and leaves reportedly produce allelopathic chemicals that accumulate in the soil and can cause mortality in other vegetation. The foliage is unpalatable to browsing wildlife and can cause allergic reactions on the skin. Because of its rapid growth, foresters use to plant this species for erosion control. In ornamental plantations it is often used as decorative plant.
In Croatia, it is present in the whole country but is especially aggressive in the Adriatic coastal part (from Istria to South Dalmatia). In some parts of the continental regions, in costal parts and in some islands, it kills native vegetation and often forms dense monocultures.

This species reproduces both from seed and root sprouts. Young plants emerge near to adult trees in very large numbers and commonly distribute locally. Human impact is a very important factor of *Ailanthus* colonization. It is usually found near busy roads, in towns, building sites and industrial yards. It is hardly ever found in undisturbed environments and stable ecosystems.

Effects of the invasion of *Ambrosia artemisiifolia* in Hungary

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Invasive alien plants pose a serious threat to the biodiversity of natural ecosystems and a significant constraint to agricultural production worldwide. Invasive alien plants (IAP) are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, outcompete natives and take over the new environment. Alien (non-native) plant species have been documented in Hungary since the 19th century and the number of alien plant species documented as of 1995 was 264; only about 10-15% of these (about 40 species) are considered to be invasive. The most important invasive plant species with an allergenic effect is the common ragweed (*Ambrosia artemisiifolia*). This plant originates in North America and has evolved to suit a dry climate and open environment. In Hungary almost 80 % of the arable land is infested and ragweed has become the most important agricultural weed in agricultural crops during the latest 20 years. *A. artemisiifolia* is a summer annual herbaceous plant with rough, hairy stems and compound, fernlike toothed leaves with greenish flowers. It belongs to the Asteraceae family. *Ambrosia artemisiifolia* is commonly found in ruderal sites associated with frequent and extensive disturbance regimes resulting from human activities. Roadsides, railways, gravel sites, construction sites, agricultural fields, waterways and urban areas are sites that this species establishes easily and prolifically. Common ragweed is a pioneer that establishes easily in habitats with bare mineral soils or sparse vegetation. Agricultural products contaminated with seeds of *A. artemisiifolia* imported from the USA and Canada is believed to be the most important entry pathway into Hungary. Commercial birdseed mixtures and transportation of seeds with machinery are other entry pathways. Water currents enhance the dispersal of the seed along riparian corridors.

Heracleum sosnovskyi habitats and naturalization in Lithuania

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Heracleum sosnowskyi is a dangerous invader which spread along roads and has naturalized in Lithuanian habitats and plant communities. It acts compressively on native species and changes community composition and structure. This huge plant forms pure stands and changes ecosystems diversity by pushing autochtones species from native habitats. *Heracleum sosnowskyi* is native to the Caucasus and Creeme. It establishes in fertile soils and completely changes habitats, therefore damaging native flora and landscapes. Consequently, this species is listed on EPPO A2 List and in national list of invasive plants. Responding to one of the greatest EU goals to prevent degradation of biodiversity up to 2010, it is currently a priority to find effective measures to stop the spread of *Heracleum sosnovskyi* in Lithuanian natural grasslands and forest habitats.

Distribution of silverleaf nightshade (*S. elaeagnifolium*) in Greece and invasiveness as related to leaf morphological characters

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Solanum elaeagnifolium is a noxious and invasive alien weed, against which international measures have to be taken in many areas, according to EPPO guidelines. It has been introduced from America to Europe, Africa, Asia and Australia, and in many cases it is considered as an important weed of croplands and pastures, mostly in cultivated land, disturbed areas, overgrazed areas, canal banks and human environments. In Greece, this invasive species causes major economic impacts related to its prevention, control and eradication (e.g. damage to crops, damages in urban areas, congestion in waterways, etc.). According to surveys undertaken during the last three years across the main cultivated zone in Greece, S. *elaeagnifolium* was found locally naturalised, it rapidly expands its habitat, progressively becoming a weed of agronomic importance. Currently, it exhibits an adaptation to a great variation of abiotic factors within its dispersal in Greek agroecosystems showing a particular preference in regions with low annual rainfall. According to our preliminary field experiment the occurrence of silverleaf nightshade in corn resulted in a maximum grain yield loss ranging from 14 to 47% for early emerging weed plants and less than 7% yield loss when the weed seedlings occurred later than the V4 corn growth stage. From this point of view, silverleaf nightshade obtains an emerging competitiveness in corn crop inducing the need of taking measures to prevent its potential introduction in other arable crops. The invasiveness of this weed is known to be aggravated by high seed production and an extensive root system that promotes vegetative multiplication, one of the main components making its control ineffective. It is widely known that the application of conventional weed control methods proved inadequate to prevent the rapid dispersal to a variety of habitats. Taking into account the role of leaf morphology, in terms of the ineffective control by means of foliage herbicides, the usual control strategy, we studied the leaf structure. Several morphological traits such as amphistomaty, abundance of palisade tissue, and hairs give an additional advantage to *S. elaeagnifolium* under the stressful Mediterranean conditions and significantly contribute to its noticeable invasiveness.
The study of the silverleaf nightshade's leaf morphology may help the future investigations on minimizing the negative impact of herbicides use and improving the control measures.

Germination ecology of the invasive *Acacia saligna* (Labill.) Wendl. (Fabaceae): interpopulation variation and effects of temperature and salinity.

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Acacia saligna (Labill.) Wendl. (Fabaceae), a phanerophyte native to the southwestern corner of Australia, was introduced in Sardinia for afforestation, mainly in coastal areas, where at present it is considered naturalized, becoming invasive in sand dune habitats. Germination tests were conducted at the Sardinian Germplasm Bank (BG-SAR), testing different temperatures and percentages of NaCl, on seeds belonging to five accessions from four populations (both from saline and non-saline environment), in order to obtain more information regarding the potential invasiveness of *A. saligna*, with particular attention to dunes and coastland habitats. The optimal temperature range for germination of all populations of *Acacia saligna* was found to be 15° -20° C, in accordance with previous germination studies on this species but it showed the capacity to germinate to a great extent at all tested temperatures; this fact, with the remarkable variability showed by the different accessions, can be interpreted as a sign of the capacity of this species to rapidly adapt to environmental changes. Salt concentration increase influenced the germinative capacity causing a decrease in final percentages. At 1% the germination fell remarkably; the final values stayed rather high only at 15°C, being almost always above 50%. At 2% of NaCl concentration, final germination percentages stayed relatively low and it occurred almost only at 15°.

Assessing the potential invasiveness of *Cortaderia selloana* in Sardinian wetlands through seed germination study.

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The present work is focused on the study of abiotic factors that may favour seed germination and the potential invasiveness of *C. selloana*, with particular attention to wetlands. Germination tests were conducted at the Sardinian Germplasm Bank (BG-SAR), testing different temperatures and percentages of NaCl in order to determine the optimal ecological conditions at which germination occurs and the effect of salt on seeds germination and viability, as well as on seedling development. Seeds completely germinated at every tested temperature, yet the higher germination rate was found at 25°C. Salinity did not prevent seeds from germinating, but it affected germination rate and seedling vigour. The population that has been taken into account in this study is located in a continental and non-artificial wetland context, whose vegetation is represented by hygrofile formations with *Phragmites australis* (Cav.) Trin. ex Steud and by *Carex* sp.pl. in the banks, belonging to *Phragmito-Magnocaricetea* Klika in Klika et Novàk 1941, followed by communities of the order *Juncetalia maritimi* Br.-Bl. ex Horvatic 1934 in the depressed areas and by therophytic formations of the class *Isoëto-Nanojuncetea* in temporary wetlands. The results of the germination tests that have been carried out prove the potential invasiveness of *C. selloana* in habitats such as lagoons and salt marshes.

Industry view on importance and advantages of a Code of Conduct on horticulture and invasive alien plants

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The International Association of Horticultural Producers (AIPH) represents horticultural producers' organisations all over the world. The horticultural industry supports the aim to preserve the biological diversity. The reinforcement of the biological diversity in urban areas, the improvement of the greening in cities is considered and supported as the essential aim of national strategies for biological diversity. Therefore AIPH has interest in the prevention of introduction and spread of invasive plants. Their interest is that a Code of Conduct is set up by the sector itself or in partnership with government and/or NGO's. A code may not just be layed upon the sector by the authorities. The rules have to be made by and in agreement with the target group. They also can agree on the sanctions, within ethical and legal boundaries.
Introducing a Code of Conduct can only be successful if there is awareness of the problem and stakeholders find it their responsibility to take preventive measures. The organisation that edits the Code of Conduct has to be representative for the sector. The form and the content have to be accessible, consistent, applicable, realistic and feasible.
To be effective a Code needs incentives, compliance and assurance. Major reasons to encourage self-regulations are 1) preventing government regulation, 2) concern for the image of the sector, 3) concern for the environment and 4) corporate social responsibility. Although Code of Conducts is not a new way of self-regulation, in the horticultural sector it is relatively new. Since the middle of the 90-ties codes of conduct or code of practice have been introduced in the field of environment and social aspects. Some Codes of Conduct or Code of Practice for preventing the spread of invasive plants have been introduced in the last few years. Other initiatives like Action Plans or Management Plans towards invasive species, edit by governments, are more compulsory.

Anigozanthos hybrids: what are the chances of eradicating this flower-farm escapee?

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Anigozanthos species (Kangaroo paws) endemic to Western Australia were introduced as a possible cut flower to a farm outside Kleinmond, in the Western Cape, South Africa. The species is well adapted to the climatic conditions and fire regimes of the Cape floristic region and has the potential to spread and threaten wetland habitats in the adjacent Kogelberg Biosphere reserve. While the threat to water resources and environmental services is likely to be low, the threat to indigenous and possibly endangered wetland species being displaced by monocultures of *Anigozanthos* is high. After initial assessments and surveys that delimited the known distribution of the hybrids to six populations, long term monitoring sites have been set up and physical clearing of the species has begun. Based on initial understanding of the population dynamics developed from data gathered during clearing operations, this paper will explore the likelihood of eradication of the species. The Nursery Industry has yet to be convinced of the invasive potential of this genus and its hybrids and claim the right to import 'sterile' hybrids of *Anigozanthos*. The complexities of dealing with a stakeholder that has an economic interest in a potentially invasive species will also be explored.

Use of "native" Cardoon (*Cynara cardunculus*) as a bioenergy crop in the Mediterranean basin: concerns regarding invasive traits of some taxa.

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In different countries of the Mediterranean Basin, the "native" cardoon (*Cynara cardunculus* var. *altilis* –DC) has been an object of research in order to study the biological and agronomic responses of different cultivars. Subsequently it has been proposed for use as a drought resistant biofuel crop capable of producing high yields especially in dry summer climate conditions. Cardoon, as a consequence of being domesticated from the "genetic pool" of a native species, is adapted to mediterranean environments. Cardoon grows mainly from seed and was domesticated from the wild artichoke. *Cynara cardunculus var. sylvestris* is a perennial species with many local genotypes, which remains completely interfertile with cardoon. The species' var. *sylvestris* can be divided into two different taxa: ssp. *cardunculus* (occurring in Italy and on the eastern side of the Mediterranean basin) and ssp. *flavescens* (occurring in Sicily, in Spain and as a weed in other med-type climates regions). The physiological and reproductive traits of cardoon make it a potentially invasive species which could harm different types of habitats: Mediterranean, arid and semi-arid, grassland habitats of native thistle plant communities (*Onopordetea acanthi- Artemisienea vulgaris;* [*Ordo*]-*Carthametalia lanati*) Natura 2000 habitats of pseudo-steppe with grasses and annuals (*Thero-Brachypodietea*) and in old fields (*Brometalia rubenti-tectorum*) where they could slow down the secondary succession re-naturalization processes. In addition, within agroecosystems grazing increases the species presence due to its inedibility. Cardoon was initially domesticated for its stalk size and then selected for biofuel cultivations, especially from Spanish genotypes. Cardoon as a biofuel crop is distinguished by its rapid growth, efficient use of water resources and great reproduction capacity. Surveys undertaken in Southern Italy's mediterranean habitats within experimental farmland fields showed that cardoon "crop escape" was already underway. Consequently the taxon poses a double threat: it may lead to hybridization with different populations of wild artichokes, and it may compete for natural resources with other native species especially in disturbed habitats. Species selected traits, together with the cropping system (annual planting, large scale intensive cultivations in different areas, harvest at senescence when pollination and seed dispersion are likely to have already occurred) make it a potentially invasive species even though domestication generally leads to reduced fertility. Cardoon is already considered a pest species in other mediterranean-type climate regions such as California, Western Australia and S. Africa. In particular the Spanish genotype seems to be much more aggressive than the Italian one and in California it appears to have evolved into larger and more fecund individuals since their introduction. For these reasons, when the species is selected and cultivated as a biofuel crop, specific cultivation criteria are needed to limit the weedy behaviour (i.e. use of non aggressive cultivars, cutting of flower heads, and establishment of a buffer zone). Spread of "wild relative" species into natural habitat may impact native biological diversity as they can compete with native vegetation and increase hybridization with congeneric native species (impacting genetic integrity). New hybrids, in addition, are better competitors for resource and space than are species of the native plant community.

Control experiments on selected invasive alien species in the Bulgarian flora

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Ailanthus altissima, *Ambrosia artemisiifolia*, *Amorpha fruticosa*, *Fallopia* ×*bohemica* and *Iva xanthiifolia* are among the worst invasive alien species in the Bulgarian flora. During the past few decades they expanded their distribution ranges in the country and threatened to native biodiversity and/or human health. Therefore, experiments for control of these species have been designed and carried out within the project 'Biology, ecology and control of the invasive alien species in the Bulgarian flora' (2009-2011). *Ambrosia artemisiifolia* and *Iva xanthiifolia* have been subjected to competition with selected forage plants such as *Medicago sativa*, *Lolium perenne*, *Dacylis glomerata* and *Elymus repens*. The latter species, especially *L. perenne*, *D. glomerata* and *M. sativa*, proved to be a reliable means to suppress the growth and seed production of the invasive species. *Ailanthus altissima*, *Amorpha fruticosa* and *Fallopia* ×*bohemica* have been subjected to various combinations of mechanical (cutting, eradication, coverage) and chemical control (gliphosate treatment) measures. The three species, and especially *F.* ×*bohemica*, showed high resistance to lower concentrations of glyphosate. The poster presents the experimental design and the results after the first year of the implementation of the control measures.
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Management of *Ludwigia peploides* (water primrose) in the Vistre River (South-East of France): first results

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The water primrose, *Ludwigia peploides,* is a non-native invasive aquatic plant in the Mediterranean part of the South-East of France. It can colonise many types of static or slow-flowing waters: rivers, shallow ponds and lakes, wetlands, etc. The biomass abundance and monospecific stands lead to local loss of floral and faunal biodiversity.
L. peploides colonised many biotopes in the Vistre River, a 46 km long river highly affected by strong hydraulic modifications, close to the urban area of Nîmes (Gard). The impact of this species on native hydrophytes (for example *Myriophyllum spicatum*) is significant in some sites.
A new watershed management plan was built in 2001 by the managers of the "Syndicat Mixte du Bassin Versant du Vistre" to increase the ecological functioning of the river. Among the management operations, the reduction of the colonization of *L. peploides* has been undertaken since 2008 by mechanical and manual removal.
In 2008, 5 km of river were managed and the volume of removed plants was 173 m^3 of wet plants, with about 100 m^3 mechanically removed, for 75 work days. In 2009, the length of managed river increased to 14 km in other parts of the river and in its affluents with 152 m^3 of manually removed plants for 85 work days. Several sites managed in 2008 showed little recolonization by the invasive plant.
A long term management of this plant is necessary to minimize all impacts of *L. peploides* and insure better ecological functioning of the river in the context of the European Water Framework Directive.

A project for the eradication and the control of *Ailanthus altissima* in a river park in Northern Italy

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The "Parco del Basso Corso del Fiume Brembo" is a park instituted by 7 municipalities along the Brembo river, in Northern Italy, Region of Lombardia, district of Bergamo. The park covers nearly 1000 hectares of level land and is placed in one of the most populated and urbanized areas in Europe. Despite the impact of urbanization, the park conserves natural environments rich of rare herbaceous plants such as semi-natural dry grasslands and riparian forests. The safeguard of these residual environments is essential both to protect biodiversity in the ecosystem of the Brembo river and to further qualify the lifestyle of the resident population. The increasing diffusion onto the environment of the invasive alien plant *Ailanthus altissima,* favoured by the closely interwoven hydrographic network crossing the park, is threatening the conservation of its natural habitats, in particular semi-natural dry grasslands. Consequently, the eradication and control of *A. altissima* became one of the primary aims of the park's management, through a six years long experimental project co-financed by regional funds and consisting in chemical treatments of the infested areas. The project, to start in august 2010, involves the prevalent use of low-impact techniques as stem injection, localized treatment of cut stump and basal bark. The herbicide (a combination of triclopyr and fluroxipyr) has been chosen as the most selective and less impacting among the few formulations registered in Italy for use on woody plants. The efficacy of the treatments and their effect on the environment will be constantly monitored, with the purpose of defining and spreading a procedure for the efficient and sustainable management of *A. altissima* in level areas of Northern Italy. Strategic guidelines also include continuous protection and prevention of new potential infestations, through educational programmes and the involvement of local administrations, farmers and citizens.

Solanum eleagnifolium, an increasing problem in Greece.

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Silverleaf nightshade (*Solanum eleagnifolium*) is thought to be native to the southwestern USA and to northern Mexico. It was observed in California before 1900 and in Greece before 1975. The last 20 years this troublesome weed has spread in all Greece, especially Thessaloniki and Chalkidiki counties because of the intensive human activities (constructions of new roads, buildings or agricultural activities). Most fields with arable, horticultural and perennial crops as well as waste places and roadsides have been infested by this weed. Silverleaf foliage is covered with star shaped hairs. Mature berries, up to 60 per plant, contain high levels of solanine and solanosine, which are toxic to livestock. Large infestations can reduce harvest yields by competing with desirable plants for nutrients and soil moisture and appear to have allelopathic effects, especially in cotton fields. This species develops colonies from creeping horizontal and deep vertical rhizomes, both of which produce new shoots. Flower clusters are modified cymes, with lower flowers being bisexual and the upper ones being functionally male. Seeds are yellowish-brown to dark yellow-brown. It blossoms from May to September with light to dark blue-lilac or white flowers. Silverleaf nightshade reproduces by seed and creeping rhizomes. Fruits and seeds disperse with agricultural activities, water, mud, soil movement and animals. Colonies of silverleaf nightshade are difficult to control or eliminate either by mechanical methods or by biological means, and there is no currently registered biocontrol agents for use against this plant. In Greece, the only mean that is used against silverleaf nightshade in irrigated summer and perennial crops consists in a weekly mowing preventing the production of new shoots and the establishment of new seedlings during summer months. However, this practice does not solve permanently the problem, as shallow cultivation does not destroy the root system and spreads rhizome fragments of this plant in non-contaminated areas.

Plant invasion, soil seed banks and native recruitment in two urban Mediterranean woodland remnants, in South-West Australia

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The Mediterranean South-West of Australia is listed within the world's 25 biodiversity hot spots where fire is important for the persistence and stability of plant communities. The dominant *Banksia* woodland is a complex fire adapted ecosystem, has a diversity of plant functional groups, with highly complex species interactions required to maintain ecological processes and resilience to disturbance. The diversity of life forms is critical for ecosystem renewal and reorganization following disturbance, providing a mechanism for resistance to change. An association has been found between structural and functional changes in plant community assembly and the frequency of fire and invasion, in two urban woodland remnants of Kings Park and Bold Park, in Perth southwest Australia. Soil seed bank studies, in situ and ex situ, and native recruitment studies, with and without invasion, have been conducted and provide an understanding of the plant communities' response to invasive species. The results of these studies have been utilised to determine new and effective management intervention techniques resulting in the conversion of a plant community once dominated by transformer invasive species to a resilient native plant community.

Applying cover crops to reduce impacts of Egyptian Broomrape in infested fields

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Egyptian broomrape (*Orobanche aegyptiaca* pers.) is a parasitic angiosperm and a major constraint to agriculture in Africa and Asia inflicting devastating losses to farmers. Management with herbicides or other methods is difficult; thus, non chemical economical methods such as using cover crops could be an effective way to prevent broomrape from spreading. To fulfil this aim, having the knowledge of the host range including hosts, false hosts or non-host seems essential. Through the current study trap and catch crops culturing to decrease infestation of Egyptian broomrape (*Orobanche aegyptiaca* Pers.) was tested in Polyethylene bag (PE bag) and pot experiments. Twenty seven crops, members of the Asteraceae, Malvaceae, Fabaceae, Cucurbitaceae, Poaceae, Pedaliaceae, Chenopodiaceae, Linaceae and Solanaceae families were grown in 2 Kg pots containing sterile soil, infested with 0.6 g of Egyptian broomrape seeds. Control pots contained only 0.6 g of Egyptian broomrape. After 75 days plants were incorporated into the soil and tomato seedlings (*Lycopersicum esculentum* Mill.) were planted in the pots. Eighty days later the experiment was terminated by determining the number and dry weight of the Egyptian broomrape shoots as well as their capsules. The most significant reduction in broomrape shoots and capsule number was demonstrated in pots which formerly contained cotton & sorghum. Furthermore, cotton decreased early infestation of the parasite, thereby significantly augmenting tomato dry weight. Results obtained through PE bags investigation were in agreement with those concluded from the pots experiment. *O.aegyptiaca* germination response next to given plants in PE bag ranged from 34% to 89%. Except for wheat, barley which were demonstrated to be false-host, all the cultured plants i.e. tomato, sun flower, soy bean, chick pea, zucchini, mung bean, corn, vetch, oat, rye, beet, sugar beet, triticale, sain foin, caster-oil plant, Mill , sesame, fiber flax, alfalfa, red been, cucumber, pepper, cotton & sorghum were determined as catch crops for *O.aegyptiaca*.

Biological characteristics of Giant sumpweed seed (*Iva xanthifolia Nutt.*) and the possibilities for fighting it by using soil herbicides

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Giant sumpweed (*Iva xanthifolia Nutt.*) is an invasive weed species which has intensively spread over the territory of Serbia, and it has gradually moved from noncrop areas to crop fields, especially row crops. On average, a single Giant sumpweed plant can produce up to 50 000 seeds. As a part of extensive research into its spreading, bioecological characteristics and possibilities of chemical control with herbicides, the study has been carried out into the features of Giant sumpweed seed and the best conditions for its germination. The aim of the research was to determine the time and pace of Giant sumpweed 's growth, and therefore develop a better strategy against its spreading. In addition, the possibilities for the chemical control of Giant sumpweed by using soil herbicides have been tested aiming to prevent its massive appearance in agrofitocoenoze. The results lead to the following conclusions:

- Giant sumpweed seed from our areas can be categorized into two groups: with larger seed, 1- 1.6 mm long, and with smaller seed, 0.75 mm long, and their relation is 65% (larger) to 31% (smaller seed). The seed starts germination at the temperature of 5 ^{0}C, and the greatest germination percentage is at 10 ^{0}C (45%) and the lowest percentage of germination is at 20 ^{0}C (18%). Regarding the time necessary for Giant sumpweed germination, the shortest period is at 20 ^{0}C (4 days), and the longest period is at 5 ^{0}C (12 days). However, temperatures below 20 ^{0}C seedlings are well developed, while at the temperature of 20 °C a great number of deformed seedlings has been noticed. These results show that Giant sumpweed accommodated well in our habitat, since, regarding the two main groups of this plant, the major part consists of larger seed plants (which show better total seed germination), and it also has a favourable temperature scope for germination when it comes to our area (5- 20 ^{0}C).

- The most frequent soil herbicides in our agricultural practice have been used in the experiment for testing the possibilities of controlling Giant sumpweed with soil herbicides. Those are: atrasine, prometryn, trifluralin, dimethenamid, acetochlor and S-metalachlor. The results indicate that Giant sumpweed is very sensitive to the performance of soil herbicides, which means that the tested soil herbicides can be efficient in fighting Giant sumpweed. Moreover, the results suggest that besides the standardized recommended quantities of these herbicides, Giant sumpweed can be controlled with half of these quantities, with the aim of lowering the amount of soil herbicides in the fields.

Allelopathic potential of rice (*Oryza sativa* L.) cultivars on barnyard grass (*Echinochloa crus-galli*)

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Barnyard grass (*Echinochloa crus-galli*) is one of the worst weeds in rice fields of Iran. One option to reduce herbicide dependency is to use allelopathic effects that rice may have on certain weeds. Laboratory and greenhouse studies were conducted to assess the allelopathic potential of 12 rice cultivars on barnyard grass. Polyethylene glycol (PEG) was used to determine the influence of osmotic potential on the bioassay materials. Effect of different concentrations (5, 10, 20, 30, 40, and 60%) of stem, root, and leaf extracts of rice cultivars on seed germination, radicle and primary shoot length of barnyard grass seedlings, and rate of respiration of root pieces were investigated in the laboratory experiments. Shoot height and dry weight of weed stands were studied in the greenhouse. Also total peroxidase activity, chlorophyll pigment and mitotic index were determined. Results indicated that, among rice cultivars, Mehr, Tarom-mahali, G3, Nemat, and Shahpasand caused the most inhibition effects on investigated factors. Amol-3 showed the least negative effects on growth of seedlings and stands of barnyard grass. In laboratory, the Mehr cultivar demonstrated the maximum inhibitory effects by reducing barnyard grass seed germination percentage (88%), radicle length (100%), primary shoot length (83%), and root respiration (85%) Cell division, expressed as mitotic index, was significantly reduced in the presence of rice aqueous extracts. Mehr cultivar had higher inhibitory effect on mitosis compared to Amol-3 and leaf extract in both species. In greenhouse, the same cultivar showed the maximum inhibitory effect by reducing barnyard grass height (45%) and dry weight (64%). With increase in extract concentration, the inhibitory effect increased. Leaf extract from rice plants was more effective compared with the root and stem extracts. Comparison of rice cultivars and PEG indicated that any reduction in germination and growth of barnyard grass using rice extract concentrations of 5 and 10% must have been the result of allelochemicals in the extracts. Lower extract concentrations showed a more pronounced inhibitory effect in the laboratory as compared to the greenhouse studies. These results suggest that rice leaf extracts may be a source of natural herbicide.

Solanum elaeagnifolium, an emerging invasive weed in the Mediterranean region and Northern Africa

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Solanum elaeagnifolium (Solanacea) is a native weed of the Southern United States and Northern Mexico and an invasive weed to North and Central Greece with rapid expansion to other regions. Because of its deep root system, resistance to drought and lack of natural enemies which could keep its population under control, the weed is becoming a nightmare for farmers and ranchers in the infested areas. In protected areas and national parks the weed is heavily suppressing the endemic plant population and is affecting the balance of natural ecosystems in these areas. Climate change in the region with increase of temperature and reduction of rain fall can affect dramatically the speed of expansion of the weed in the Balkan Peninsula and other countries in southern Europe. One of the major obstacles to controlling the weed is the high number of commercial, medicinal and ornamental plants which are closely related to the weed.
In an effort to reduce the weed's population and its spread, USDA ARS European biological control laboratory and Benaki Plant Pathology Institute recently started a joint biological control program to investigate the possibility of introduction and testing of the weed's natural enemies from United States and to study their suitability for release in Greece and the European Union to stop the spread of the weed.

Evaluation of Indigenous Fungi as Potential Biological Control agents to Cocklebur (*Xanthium strumarium* L.)

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Weeds constitute a serious problem to crop production in Sudan. *Xanthium strumarium* L. commonly known as cocklebur is a serious weed newly introduced in the Sudan which quickly became problemetic in many agricultural areas, waste lands and/or along water canals and river banks. This study was conducted to investigate the feasibility of using indigenous fungal plant pathogens as biological control agents to cocklebur. Different infested locations were surveyed for collection of naturally infected plants of cocklebur. Fungi belonging to seven genera were found associated with the weed. They were identified as: *Alternaria* sp., *Bipolaris* sp., Cercospora xanthicola, *Curvularia lunata*, *Fusarium oxysporum*, *Phoma* sp. and *Rizochtonia* sp. Isolated fungi were tested for pathogenisity and host specificity by applying each isolate as 2 x 10^6 conidia/ml suspension containing 0.01% Tween 20 under a condition of 48 h dew period. *Alternaria helianthi*, *Bipolaris* sp., *Cercospora* sp. and *Phoma* sp. were highly pathogenic to cocklebur when applied on the weed at 2-3 leaf stage. Among them, *Cercospora* sp. showed good degree of selectivity towards the weed when initially screened against cotton, sorghum, sunflower, tomato or *Sonchus cornutus*. Therefore, *C. xanthicola* may be considered as a potential biocontrol agent for cocklebur.

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