



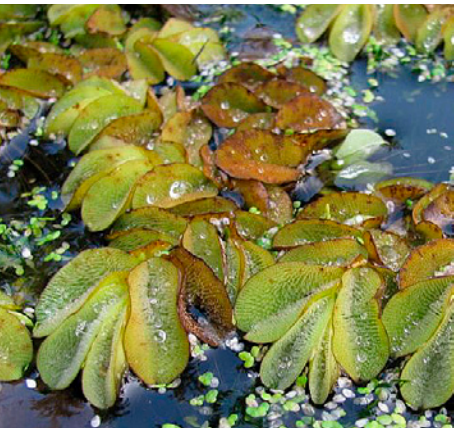

3rd International Symposium

Environmental Weeds and Invasive Plants

October 2nd to 7th, 2011

Monte Verità, Ascona, Switzerland

Abstracts

Editors
Christian Bohren, Mario Bertossa, Nicola Schoenenberger,
Marta Rossinelli, Marco Conedera

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Symposium venue

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Session organizers

Session 1

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General Information to participants

We welcome you to the 3rd Symposium on Environmental Weeds and Invasive Plants (Intractable Weeds and Plant Invaders) and hope you will have an exciting conference, an interesting field trip and a pleasant stay in Ticino.

Catering
Coffee breaks, lunches (Monday, Tuesday, Thursday, and Friday) dinners (Monday, Thursday), and the welcome reception (Sunday) are included in your registration.
Coffee breaks are served at the bar, lunch and dinner in the restaurant.

Speakers
Speakers are kindly requested to contact the chairman of their session block in order to upload their presentation before the beginning of the session. PC projection will be provided. Please take note that it will not be allowed to present from your own computer.

Extended abstract
Extended abstract are available at www.invasive.weeds.ascona.ewrs.org/
und www.wsl.ch/publikationen/ewrs

Posters
Poster set up from Sunday evening onwards. Posters should be put up at the latest in the morning of the day allocate to its presentation and may hang during the whole symposium. You may find your poster place by the number corresponding to the page number in this program. Authors are expected to be in attendance during the poster sessions. Please be also prepared for a short (3 min) presentation in the plenary. Posters must be removed by Friday October 7th noon at the latest.

Internet access
Monte Verità provides a WLAN-Access point within the whole congress area. Please select the CSF-net and enter "conference" as password.

Conference dinner
A conference dinner will be organized Tuesday October 4th at the Isole di Brissago. To join the dinner you need to be registered in advance. A correspondent tag will appear on your congress pass. Departure time and detailed program will be communicated during the daily session.

Field trip
Wednesday October 5th is devoted to the field trip. To join the field trip you need to be registered in advance. A correspondent tag will appear on your congress pass.
Please note that we will start at 8:45 and be back in Ascona late at night. So please take some warm clothes with you.
In the morning we will visit the Bolle di Magadino wetlands. Because of the possible presence of mosquitoes we advice to wear long clothes.

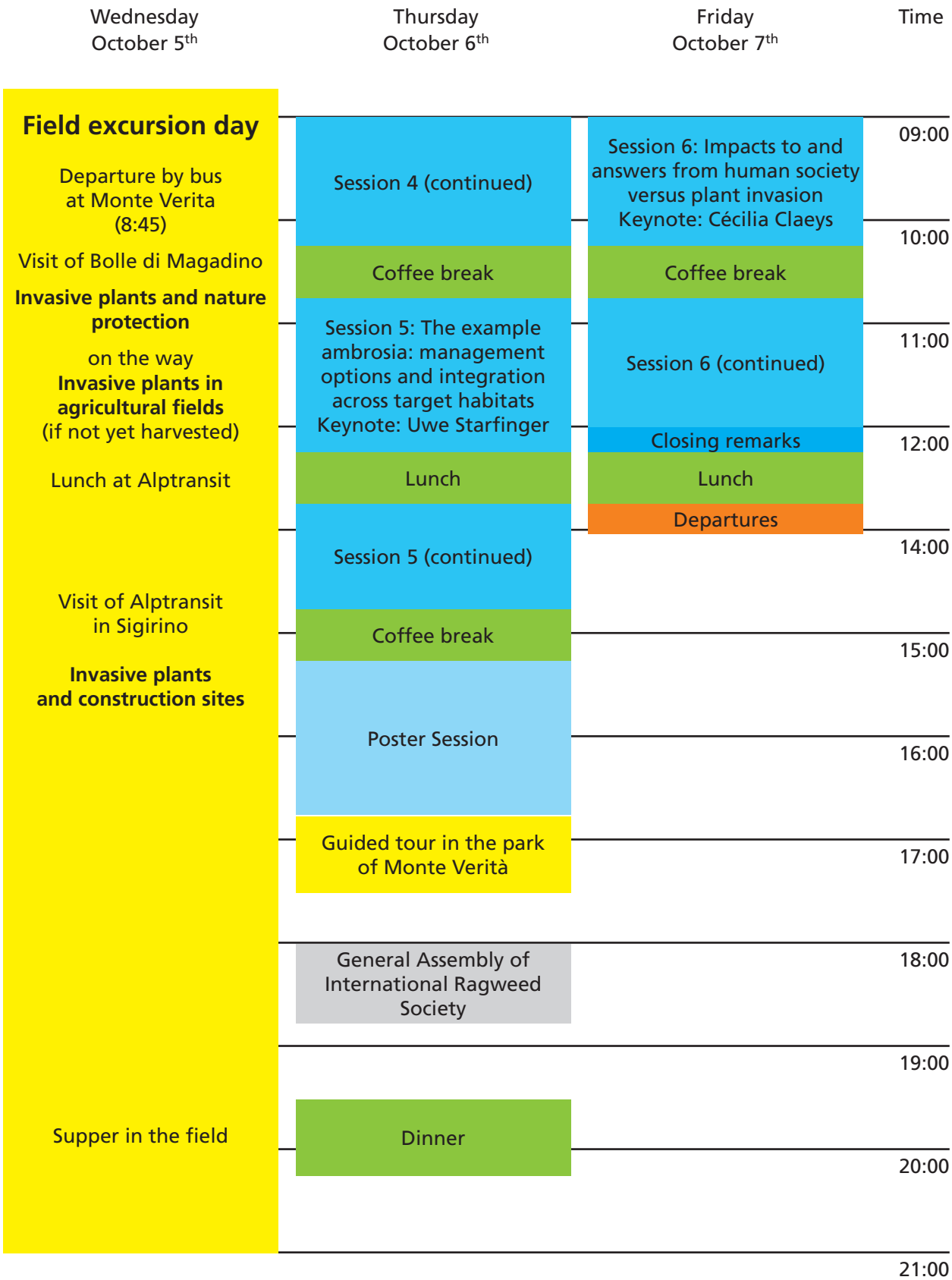
Hotel pick up service
For participants staying in hotels outside the Monte Verità a shuttle bus will be organised at 8:30 am from the Post Office in Ascona downtown to the conference site (on Wednesday departure at 8:15).

Registration fee does not cover accommodation, meals, drinks and transport other than that provided as part of the Symposium program as well as optional sightseeing tours and excursions

Schedule at a glance

Time	Sunday October 2nd	Monday October 3th	Tuesday October 4th
09:00		Welcome / introduction Keynote: Nicola Schoenenberger	Session 2 (continued)
10:00		Coffee break	Coffee break
11:00		Session 1: Causes and impacts of plant invasions Keynote: Urs Schaffner	Session 3: How far are control methods transferable between agricultural weeds and plant invaders? Keynote: Markus Hochstrasser
12:00		Lunch	Lunch
14:00		Session 1 (continued)	Session 3 (continued)
15:00	Arrivals Registration opens at 14:00	Coffee break	Coffee break
16:00		Session 2: Agricultural weeds and plant invaders: biology, ecology, what can we learn from each other? Keynote: Mark van Kleunen	Session 4: Invasive aquatic weeds, difference to terrestrial weeds and invasive plants? Keynote: Andreas Hussner
17:00		Poster Session	Poster Session
		Seminar or WG meetings	Seminar or WG meetings
18:00	Coffee / snacks Official reception		
19:00			
		Dinner	Conference dinner on Isole di Brissago
20:00		Public regional meeting (in Italian language)	
21:00			

Schedule at a glance



Monday, October 3rd

Introduction	Chair: Marco Conedera
9:00–9:30	Welcome adresses
9:30–10:15	Alien plants in southern Switzerland, one of Europe's invasion hotspots Keynote: Schönenberger, N.
10:15–10:45	Coffee break
Session 1	**Causes and impacts of plant invasions** Chair: Tramontini, S.; Müller-Schärer, H.
10:45–11:15	Environmental impact of invasive plants: from cases studies to meta-analyses Keynote: Schaffner, U.
11:15–11:30	Invasive Alien Plant Species and their effects on Biodiversity Conservation in Nigeria Borokini, T.I.
11:30–11:45	Role of the European Food Safety Authority in risk assessment of exotic harmful organisms Gilioli, G.
11:45–12:00	Propagule sources and post-fire spread of alien plant species. A case study from Ticino Maringer, J.
12:00–12:15	Community-level impacts of three invasive alien plants in Mediterranean coastal habitats Chague, N.
12:15–13:45	Lunch
13:45–14:00	How habitat destruction influences the invasion of exotic species with different competitive abilities Liu, H.
14:00–14:15	Propagation of *Grevillea banksii,* an invasive exotic plant species: impacts on structure and functioning of mycorrhizal community associated with natives tree species in eastern part of Madagascar Andrianandrasana, M.D.
14:15–14:45	Discussion / poster presentation session 1
14:45–15:15	Coffee break
Session 2	**Agricultural weeds and plant invaders: biology, ecology, what can we learn from each other?** Chair: Bretagnolle, F.; Fried, G.
15:15–15:45	The ´weedy´ traits of invasive alien plants Keynote: van Kleunen, M.
15:45–16:00	Linking species traits of alien plants with environmental characteristics of agricultural habitats Jauni, M.
16:00–16:15	The Riddle of *Gunnera tinctoria* Invasions: a Particularly Irish Enigma Osborne, B.
16:15–16:30	Morphological and molecular identification of invasive and autochthonous *Vitis* taxa along Hungary Bodor, P.
16:30–17:15	Poster session

Tuesday, October 4th

Session 2 continued
Agricultural weeds and plant invaders: biology, ecology, what can we learn from each other?
Chair: Bretagnolle, F.; Fried, G.

9:00–9:15 Genetic diversity in native and invasive populations of *Taeniatherum caput-medusae* ssp. asperum (medusahead): evidence for multiple introductions, source populations and founder effects
Novak, S.J.

9:15–9:30 Growth, reproduction and plant damage of *Cirsium arvense* in its native and invasive range
Abela Hofbauerová, I.

9:30–9:45 Differences in population dynamics between native and invasive *Centaurea stoebe:* the role of life cycles and the impact of specialist herbivores
Hahn, M.

9:45–10:15 Discussion / poster presentation session 2

10:15–10:45 Coffee break

Session 3 **How far are control methods transferable between agricultural weeds and plant invaders?**
Chair: Hatcher, P.; Soukoup, J.

10:45–11:15 Control of invasive neophytes: using synergies in Swiss argricultural practice
Keynote: Hochstrasser, M.

11:15–11:30 Spread and control options of the poisonous grassland weed *Senecio aquaticus*
Bassler, G.

11:30–11:45 Plant preference by a specialist herbivore and its parasitoid on an exotic and native plant
Fortuna, T.

11:45–12:00 Host Category Defining to Mitigate *Orobanche aegyptiaca* Pers. Infestation
Ghotbi, M.

12:00–12:15 Evaluation of herbicidal activity of metabolites of *Trichoderma* spp. for the management of parthenium weed
Javaid, A.

12:15–13:45 Lunch

13:45–14:00 Are biological traits behind the success of exotic plants in irrigated crops? The case of fruit tree orchards in NE of Spain
Juárez, A.

14:00–14:15 *Hordeum spontaneum:* Invasive weed threatenes wheat farms in Iran
Mirjalili, A.S.

14:15–14:45 Discussion / poster presentation session 3

14:45–15:15 Coffee break

Session 4 **Invasive aquatic weeds, difference to terrestrial weeds and invasive plants?**
Chair: Starfinger, U.; Bohren, C.

15:15–15:45 Aquatic plant invaders in European freshwater ecosystems: an overview
Keynote: Hussner, A.

15:45–16:00 Changes in aquatic macrophyte communities in large oligotrophic Lake Ala-Kitka, northeastern Finland – effects of invasive aquatic macrophyte *Elodea canadensis*
Väisänen, A.M.

16:00–16:15 Management of invasive alien species in French aquatic ecosystems: first results of a national survey
Mazaubert, E.

16:15–16:30 Importance of *Ludwigia grandiflora* as invasive weed on meadows in West France
Haury, J.

16:30–17:15 Poster session

Thursday, October 6th

Session 4 continued
Invasive aquatic weeds, difference to terrestrial weeds and invasive plants?
Chair: Starfinger, U.; Bohren, C.

9:00–9:15 Impact of an invasive aquatic plant: the case of *Ludwigia grandiflora*
Stiers, I.

9:15–9:30 Assessment of the management of the biological invasion of Water primrose species in France
Dutartre, A.

9:30–9:45 *Cabomba caroliniana* Gray in The Netherlands
van Valkenburg, J.

9:45–10:00 Relative growth rate and strategy of invasive and native Lemnid species in indoor and field experiments: is there an effect of nutrient reduction?
Gérard, J.

10:00–10:15 Discussion / poster presentation session 4

10:15–10:45 Coffee break

Session 5 **The example ambrosia: management options and integration across target habitats**
Chair: Karrer, G.; Wohlgemuth, T.

10:45–11:15 Can Europe successfully fight the ragweed invasion?
Keynote: Starfinger, U.

11:15–11:30 European initiative for sustainable management of *Ambrosia artemisiifolia*
Müller-Schärer, H.

11:30–11:45 Common ragweed pollen counts (Cour's method), temperatures, rains, relative humidity: evolution 1982–2010 in Lyon (France)
Méon, H.

11:45–12:00 Population structure and migration routes of the invasive Common ragweed in eastern Central Europe deduced from microsatellite markers
Blöch, C.

12:00–12:15 Competitive suppression of common ragweed in early successional stages of revegetation
Milakovic, I.

12:15–13:45 Lunch

13:45–14:00 The "Berlin Action Programme against *Ambrosia*"
Dümmel, T.

14:00–14:15 Optimization of cutting regimes for control of ragweed along roadsides
Karrer, G.

14:15–14:45 Discussion / poster presentation session 5

14:45–15:15 Coffee break

15:15–16:15 Poster session

16:15–17:15 Guided tour in the park of Monte Verità

Friday, October 7th

Session 6 **Impacts to and answers from human society versus plant invasion**
Chair: Uludag, A.

9:00–9:30 The perception and management of invasive plants: Between environment and social changes
Keynote: Claeys, C.

9:30–9:45 IASWATCH under EYEONEARTH
Uludag, A.

9:45–10:00 Prioritization of alien plants for risk analysis
Starfinger, U.

10:00–10:15 Lists of invasive alien plants – a tool for implementing
Rometsch, S.

10:15–10:45 Coffee break

10:45–11:00 Status of knowledge on invasive species in Mexico: future steps
Koleff, P.

11:00–11:15 AGIN a working group of the cantonal authorities of Switzerland to coordinate their reaction concerning neobiota
Fischer, D.

11:15–11:30 Evolution of prevalence of ragweed pollinosis in Europe: studies or estimations, 1987–2010
Déchamp, C.

11:30–12:00 Discussion / poster presentation session 6

12:00–12:15 Closing remarks

12:15–13:45 Lunch

Abstracts

Session 1

Causes and impacts of plant invasions

Oral presentations

Keynote

Environmental impact of invasive plants: from cases studies to meta-analyses

Schaffner, Urs

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Over the past decade, a large number of experimental and review studies have addressed the factors that increase the likelihood of exotic species to become invasive. On the other hand, despite the global concern about losses of biodiversity and ecosystem functioning, relatively little effort has been put in collecting quantitative information on the actual environmental impact caused by invasive species. Also, there is a lack of conceptual frameworks to assess environmental impact and to develop generalities in terms of how impact depends on species traits or habitat attributes, how impact varies across levels of ecological complexity (populations, communities, ecosystems), across trophic levels, or in time. More quantitative data based on detailed case studies or on multi-species comparisons would not only allow testing some of the basic concepts of ecology, but also setting priorities in managing biotic invasions, and potentially assessing the environmental risks associated with non-native species prior to their introduction. Focusing on invasive plant species, arguably the best studied group among the long list of invasive species, I will try to elaborate key questions that need to be addressed in future studies addressing the environmental impact of invasive species.

Keywords
ecology, biotic invasions, non-native species, environmental impact

Invasive Alien Plant Species and their effects on Biodiversity Conservation in Nigeria

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This study was conducted to identify the invasive species in the field gene bank of the National Centre for Genetic Resources and Biotechnology (NACGRAB), Ibadan, Nigeria, on the latitude 7° 22′ north of the equator and longitude 3° 50′ east of the Greenwich Meridian, and also to assess the level of the species' disturbance to the conserved native plants in the protected area. This study involved sampling of the field gene bank and an on-site assessment and identification of the species and their effects on the indigenous plants established in the field for conservation. Twenty-five invasive plant species were identified, across 16 plant families, of which 14 were herbs, followed by vines, shrubs, and trees, all of which are presently estimated to occupy about 18% of the gene bank. The effects of IAS on the indigenous plants conserved in the field gene bank range from competition for space and nutrients and alteration of the tree canopies (thereby affecting the microclimatic conditions in the lower strata) to obstruction of the plants' reception of sunlight (which could thereby reduce the potential yield of the fruit trees in the gene bank. Human disturbance was observed as the major factor responsible for the spread of these IAS in the gene bank. The paper concludes by advocating stricter screening measures before introducing new plants into the country, capacity building on the early detection and management of IAS in protected areas for the technical staff, biological control, and exchange of technical information among concerned countries.

Keywords
Invasive alien species, Biodiversity conservation, field gene bank, NACGRAB, Nigeria

Role of the European Food Safety Authority in risk assessment of exotic harmful organisms

Gilioli, Gianni

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The European Food Safety Authority provides independent and transparent scientific advice and 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. Since its inception in 2006, the Panel has delivered about fifty scientific opinions on the risks posed by various species of exotic plant pests, pathogens, and invasive plants. Though every pest risk assessment procedure includes the assessment of environmental consequences of introduction and spread of pests, currently there are neither guidelines, nor standardised methodology supporting this procedure. EFSA is developing a document that will review the current approaches and methodologies that assess environmental risks related to pests, and, more important, will recommend a methodology to prepare an environmental risk assessment of plant pests, including invasive plants. The guidance document will be subjected to a public consultation, which will also involve the scientific community engaged in environmental risk assessment of weeds and invasive plants in new territories.

Keywords
risk assessment, Europa

Propagule sources and post-fire spread of alien plant species. A case study from Ticino

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2: Swiss Federal Institute of Forest Snow and Landscape Research WSL
3: Karlsruhe Institute of Technology KIT, Germany

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Disturbances, such as fire, are important components of many ecosystems. However, fire is also known to increase the invisibility of plant communities by alien plant species. This problem has been recognized and intensively studied but little is known about the importance of propagule sources for the spread of alien plant species into disturbed ecosystems. Is the spread of alien plant species into disturbed areas dependent on propagule sources in the surrounding gardens? Are there any differences in the way alien plant species invade forest ecosystems depending on their propagule dispersal strategy? We addressed these questions in a case study in the Swiss Canton of Ticino. In April 2006, a fire with unusual intensity burnt a forest area of 55 ha. Vegetation data of alien plant species in the surrounding private gardens were collected in summer 2008 and a year later within the burnt and unburnt sections of the forest. Seedling data was systematically collected by species, age and external damages. We detected two main groups of alien plant species in both forest ecosystems. At the burnt site we found mainly pioneer light-demanding alien plant species with wind dispersed seeds. Their abundance did not depend on surrounding propagule sources. Compared to the pioneers, shade tolerant and mainly bird-dispersed alien plant species tended to spread into the unburnt forest. Most of the latter group are laurophyllous. It was also recognized that some alien plant species invaded the burnt and unburnt forest although they were not cultivated in the surrounding gardens.

Keywords
post fire invasion, *Robinia pseudoacacia, Ailanthus altissima,* invasive alien species

Community-level impacts of three invasive alien plants in Mediterranean coastal habitats

Chague, Nicolas (2); Fried, Guillaume (1)

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2: Université de Bourgogne, France

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Rigourous impact assessments are of vital importance for policy makers or land managers which have to set management priorities between invasive species, given limited financial resources. Although there is a general consensus regarding the negative effect of invasive alien species, studies that quantify community-level effects of invasive plants are still scarce. The aims of this study were i) to explore the impact of invasive plants on plant communities diversity and composition and ii) to analyze how this impact can vary according to the abundance and the traits of the invaders as well as the traits of native species. For three invasive species, representing different growth forms (*Amorpha fruticosa, Carpobrotus* spp. and *Phyla filiformis*), 90 pairs of vegetation plots were sampled during spring 2011, in invaded areas and in neighbouring non-invaded areas. In addition, the sampling also covers a gradient of ~ 0% to ~ 100% coverage of *Carpobrotus.* Our study highlights that the nature and the magnitude of the impacts differed markedly according to the invading species and the invaded habitat. The impact on native species richness was highest for *Carpobrotus* (50% to 66% of species loss) followed by *P. filiformis* (11% to 26%) while dense stands of *A. fruticosa* had only an impact on species composition (in favour of annual nitrophilous species). Concerning abundance-effect relationships, species richness decreased linearly with increasing *Carpobrotus* cover, without detectable thresholds. Finally, the influence of the size of the native dominant species on the magnitude of the observed impact is discussed.

Keywords
ecological impact, traits, plant height, plant cover, communities, species richness, species evenness, mediterranean

How habitat destruction influences the invasion of exotic species with different competitive abilities

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Invasive exotic species and habitat destruction are the major causes of biodiversity loss. Their interactive effects on species diversity are seldom studied. The effects of habitat destruction on the exotic species with different competitive abilities have been simulated by a multi-species model based on competition-dispersal trade-off. The results show that: 1) The introductions of exotic species will threaten species adjacent in the competitive hierarchy firstly, and then their inferior competitors. 2) The extinction caused by invasive species will proceed in order from best to poorest. 3) The responses to habitat destruction of exotic species will vary according to the odd-ranked and even-ranked species. 4) The invasion success is dependent on the interaction between habitat destruction and competition between exotic and native species. So, strategies for habitat conservation to control exotic species should take the interactive effects of habitat destruction and competition into consideration. Moreover, to protect and develop superior competitor next to exotic species will be effective to control exotic invasion.

Keywords
competitive ability, exotic invasion, habitat destruction, competition-dispersal trade-off

Propagation of *Grevillea banksii,* an invasive exotic plant species: impacts on structure and functioning of mycorrhizal community associated with natives tree species in eastern part of Madagascar

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Propagation of exotic plant species is found in many regions of Madagascar Island. This work aims to describe the impacts of propagation of *Grevillea banksii* on soil microbial activities and on the regeneration of two native tree species (*Intsia bijuga* and *Dalbergia trichocarpa*) in the eastern part of Madagascar. The study was conducted within Ianjomara forest where some structure of the vegetation are observed such as an area characterized by grassland (P1), by homogeneous population of *Grevillea banksii* (P2) and by a natural forest composed mainly by *Intsia bijuga* or *Dalbergia trichocarpa* (P3 and P4). Structure of mycorrhizal fungi communities and associated microorganisms were described on soils from each study plots. Cultivated on P1, P2, P3, P4 soils previously colonized by *Grevillea banksii* during 4 months, the development of *Intsia bijuga* and *Dalbergia trichocarpa,* was evaluated after 4 months culturing. According to the nutrients availability on each soil types, the development of *Grevillea banksii* was accompanied or not by a high formation of proteoïd roots. Our results showed also that soil occupation by *Grevillea banksii* decreased the total microbial and phosphatases activities of soil especially on soil within a high density of proteoid roots. Slightly mycotrophic, *Grevillea banksii* disturb the structure and the dynamics of symbiotic microflora such as endomycorrhizal fungi (MA) and rhizobia associated with the two native tree species. Those findings illustrated the negative impact of *G. banksii* propagation on the regeneration and the conservation of native tree species in Madagascarian forest.

Keywords
Invasive plant, *Grevillea banksii,* microbial community, proteoid roots, native tree species

Session 1

Causes and impacts of plant invasions

Posters

Cardinal temperatures of three invasive weeds in Iran

Sohrabi, Sima (1); Gherekhloo, Javid (2); Ghanbari, Ali (1); Rashed Mohasel, Mohamad Hassan (1); Nassiri Mahalati, Mahdi (1); De Prado, Rafael (3)

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Smellmelon is an herbaceous, annual vine of the Cucurbitaceae family that it has invaded to soybean fields in north of Iran (Golestan province). Syrian mesquite is a xerophytic woody shrub of Fabaceae family which became widespread in many parts of Iran. Lesser celandine is an invasive perennial with tuberous root weed of Ranunculaceae family that has invaded to wheat fields in western Iran mainly Lorestan province. To determine cardinal temperatures of these invasive weeds three separate experiments were conducted in a completely randomized design with four replications. Seeds of Smellmelon were incubated at 20, 25, 27, 30, 35, 37, 40, 43 and 45 ˚C for 2 weeks. Seeds of Syrian mesquite after Soaking in concentrated sulfuric acid for 30 min and breaking dormancy were incubated at 15, 20, 25, 30, 35, 40 and 45 ˚C for 2 weeks. Tubers of Lesser cleandine after breaking dormancy (more than 2 weeks at 4 or 8 ˚C) were incubated at 1, 5, 10, 15, 20 and 25 ˚C for 2 weeks. Obtained data subjected to regression analysis using intersected-lines model (ISL). The results showed that the optimum temperature for seeds germination of Smellmelon, Syrian mesquite and tubers germination of lesser cleandine was 34.5, 34 and 10˚C respectively. Base temperature for germination of Smellmelon, Syrian mesquite and tubers germination of lesser cleandine estimated 24.7, 11 and 0 ˚C, respectively. Ceiling temperature for mentioned weeds also estimated as 44.5, 45.5 and 25 ˚C, respectively.

Keywords
Cucumis melo (Smellmelon), *Prosopis stephaniana,* syn *P. farcta* (Syrian mesquite), *Ranunculus ficaria* (Lesser cleandine)

Invasion of an exotic plant species, *Pinus patula,* within the sclerophyllous forest of *Uapaca bojeri:* effects on soil microbial activity.

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Some exotic species become invasive by modifying the structure of mycorrhizal community, soil microbial activity and by disturbing native plant regeneration in the host ecosystem. The aim of this study was to assess the impact of the invasion of an exotic species, *Pinus patula,* on soil ectomycorrhizal fungus dynamics and on the development of *Uapaca bojeri,* an endemic tree species in the sclerophyllous forest of Madagascarian Highland. Seedlings of *U. bojeri* and *P. patula* were planted under controlled conditions on soil collected under *U. bojeri, P. patula* and on degraded area outside vegetation influences respectively. Plant development, soil enzymatic activities, and root mycorrhizal rate were evaluated. Shoot and root biomass weight of *P. patula* seedlings grown on soil collected under *U. bojeri* and *P. patula* were significantly higher than those cultivated on degraded soil. However, seedlings development of *U. bojeri* was inhibited on soil previously influenced by *P. patula.* Regarding the ectomycorrhizal morphotypes, root system of *U. bojeri* seedlings grown on its original soil showed an ectomycorrhizal rate significantly higher with an important morphological diversity than those recorded on seedlings cultivated on *P. patula* original soil. Moreover, soil colonization by *P. patula* decreased phosphatase and total microbial activities especially on soil from the habitat of *U. bojeri* and on degraded soil. These results suggest that the dynamic of soil microbial community within the forest ecosystem of *U. bojeri* was negatively influenced by the propagation of the exotic plant species, *P. patula,* and that this exotic plant species constitutes a significant threat for native plant regeneration and for sustainable management of the ecosystem.

Keywords
Biological invasion, *Uapaca bojeri,* ectomycorrhiza, soil microbial activities, exotic plant species

Climatic Potential and Key Meteorological Drivers for the Dynamics of Invasive Plant Species in Romanian Protected Areas

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Climatic factors are key drivers in the dynamics of invasive terrestrial plant species (ITPS) especially when dealing with protected areas. Some of the most representative exotic ITPS are: *Ailanthus altissima, Acer negundo, Amorpha fruticosa.* The paper is aiming to analyse both the climatic potential and drivers responsible for the occurrence, development and spread of ITPS in the Romanian protected areas. Therefore, we used and processed annual, monthly and daily extreme climatic values (temperature, precipitations, wind) from all the relevant meteorological stations for the Romanian protected areas for the 1961–2007 time frame. Based on these climatic data, the climatic potential characteristic to the protected areas responsible for the development of the ITPS according to the climatic requirements of species and to the other environmental drivers were analyzed. Additionally, the paper is aiming to make a selection of the most widespread and aggressive ITPS in the Romanian protected areas in order to draw up each one's niche profile in terms of climatic and topoclimatic requirements related to thermal, pluvial and eolian factors' dynamics (parameters of temperature, precipitations, wind etc.). Ultimately, based on each plant's climatic profile/requirements one could outline the key meteorological drivers responsible for their dynamics in the Romanian protected areas. The climatic potential and key meteorological drivers identified for these ITPS will be used for the management and control measures required by each protected area's management plan.

Keywords
meteorological drivers, Invasive Plant Species (IPS), climatic potential, Romanian protected areas

Evaluation of *Solidago gigantea* Aiton allelopathic influence on seed germination of winter oilseed rape and winter cereals

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Solidago gigantea Aiton is a very common weed species in the whole area of Poland, especially on fallow lands. The surface of this area is decrease each year because they are restored to agriculture production. The important problem is establish if a aboveground parts and roots of *S. gigantea* ploughed under have allelopathic influence on seed germination of winter oilseed rape and winter cereals. In the year 2010 the 3 series of trials in greenhouse conditions were carried out. In this experiments allelopathic influence on seed germination and early growth of roots the winter oilseed rape and winter cereals were estimated. In the trials the water extracts from aboveground parts and roots of *S. gigantea* were used. The allelopathic effect in the microbiotest Phytotoxkit was estimated. The strongest effect of germination and roots growth curbing at winter wheat treated by above-ground parts extract was observed. The roots were shorter by 52% however the germination capacity was reduced by 36%. The extract from roots of *S. gigantea* have had a little bit weaker effect on germination and roots growth of winter wheats. The length of roots and the germination capacity was curbed by 15–17%. In the case of triticale the growth of roots was reduced for 21% by water extract from aboveground parts of *S. gigantea*. The germination capacity of triticale and rye was lower by 16% under influence of rood extract. In the case of winter oilseed rape and winter barley only a little bit influence of water extracts from *S. gigantea* on seeds germination and roots growth was observed.

Keywords
Solidago gigantea, fallow lands, allelopathy, microbiotest

Invasive Plants Which Threaten Natural Forest Ecosystems of Turkey

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In Turkey, there are many herbaceous and woody exotic plant species used in reforestations and urban landscape activaties in past. Those plant species have been acquired an invasive and today, they are devastating natural forest ecosystems and biological diversity. In forest lands: *Eucalyptus camuldulensis* planted in Mediterrenean region causes a soil drought devestate the biological diversity of sands and wetlands. *Pinus radiata, Pinus pinaster, Pseudotsuga menziesii, Robinia pesudoacacia* and *Acer negundo,* which have been naturaized and rapidly spread, cause confused problems and close to nature in reforestations and conversions in Black Sea region and other georaphical regions. In urban lands, *Ailanthus altissima, Amorpha fruticosa,* could easily occupy roadsides, constructions historical and archeological lands. *Diospyros lotus* which is produced for its fruits has been acquired an invasive in Black Sea Forests while *Acacia cyanophylla, Casuarina equisetifolia, Opuntia ficus-indica, Lavetera arbore* and *Agave americana,* adapted to Mediterrenean forest ecosystem, damege to natural lands. Also *Sicyos angulatus, Abutilon theophrastii, Calendula arvensis, Phytolacca americana, Cartobrotus edulis, Ambrosia elatior* and *Conyza canadensis* are other naturalized invasive herbaceous plants in different natural forest ecosytems of Turkey. Invasive plant species threaten natural forest ecosysetms should be determined and „in-situ“ mangement plans which conserve the biological diversity should be used in ruralurban lanscape studies and other forestry activities. Also in those activities natural palnt species acording to biological diversity structure should be used in comparison to invasive plants.

Keywords
Invasive plants, natural forest ecosystems, threaten and Turkey

Impact of *Psidium cattleianum* invasion on soil microbial function and *Uapaca louvelii* regeneration, an autochthon forestry essence of Forest, Madagascar

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Perturbations caused by alien species on native plants regeneration and on soil microbial dynamics are the major problem in terms of biodiversity conservation. In this study, our main objective was to evaluate the impacts of the propagation of an exotic plant species, *Psidium cattleianum*, i) on soil mycorrhizal fungus dynamics, and ii) on the regeneration of *Uapaca louvelii* an endemic species in the Eastern forest of Madagascar. Soil samples were collected within a homogenous formation of *P. cattleianum,* within a natural forest unperturbed by the presence of *P. cattleianum,* dominated mainly by the population of *U. louvelii,* and on a degraded soil outside vegetation influences. Soil enzymatic activities, the most probable number of mycorrhizal propagules in soil and the total number of arbuscular Mycorrhiza (AM) spores in soil were measured. Seedlings developments of *U. louvelii* planted with seedlings of *P. cattleianum* or planted on soil previously colonized by *P. cattleianum* were measured after 4 months under greenhouse conditions. The total numbers of AM Fungal spores were significantly high in soil collected on the degraded soil and under the population of *P. cattleianum.* Total microbial activity and soil phosphatase activities were significantly higher in natural forest than those recorded with the other soil types. It was also showed that the development of the seedlings of *U. louvelii* was inhibited by the presence of *P. cattleianum* or when they were planted on soil previously influenced by this exotic species. Those results show that *P. cattleianum* perturbs soil microbial functions and have negative effects on the development of *U. louvelii.*

Keywords
Biological invasion, *Psidium cattleianum,* regeneration, native essence, *Uapaca louvelii*

Effects on plant and lichen diversity of black-locust invasion in Tuscany (Central-Italy)

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Black-locust (*Robinia pseudoacacia* L.) is a worldwide invader. In central and north Italy, its establishment was promoted by both chestnut blight and oak exploitation in the early 20th century, causing relevant changes in the landscape. The process of invasion is still increasing, being enhanced both by forest management in native oak and chestnut woodlands and the increase of urbanization in hilly areas. Despite this situation, exhaustive studies on the biology, ecology and distribution of black locust are still scanty in Italy and effects of this invasion on biodiversity are poorly known. The aim of this work was to compare species richness and composition of vascular plants and epiphytic lichens between native and black locust forests. The distribution of black locust was mapped in detail (1:10.000) in the whole administrative province of Pistoia (north-west Tuscany). According to structural features, black locust formations were classified into three successional stages. In each stage, seven 10x10 m plots were randomly placed, minimum distance between plots of the same stage being 500m. Seven additional plots were placed in neighboring oak forests. In each plot, species richness and composition of vascular plants and epiphytic lichens were assessed using standardized methods. Significant differences in species richness and composition between native deciduous and black-locust forests were found for both organism groups, species richness being higher in native forests. Differences in species composition are mainly associated to a shift from plants and lichen communities typical of montane deciduous forests to more disturbance tolerant communities.

Keywords
Robinia pseudoacacia, invasion, Northern Apennines, diversity, native deciduous forests, native lichens

Studying the effects of redroot pigweed *(Amaranthus retroflexous)* density and different levels of nitrogen on yield and yield components of safflower *(Carthamus tinctorius)*

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The best way of weed management is accessible through recognizing how weeds compete with crops. Weed density is one of the most important factors affecting weed competition with crops and will justify some part of crop yield loss in competition with weeds. Desirable crop nutrition can be considered as a promising method for reducing the interference of weeds with crop plants. Nitrogen is of great importance in competition between plants. On this basis, a split plot experiment based on randomized complete block design with 4 replicates was conducted at Research Farm of Agriculture College of Birjand University, Iran during 2009. Experimental factors were nitrogen fertilizer (50, 100 and 150 kg ha^{-1} of nitrogen) as main plots and pigweed density (0, 4, 6 and 8 plants m^{-1} of crop row) as sub plots. Overall, the results of this study showed that yield and yield components (including 1000-grain weight and number of heads per square meter) increased with increasing nitrogen fertilizer. So that increasing nitrogen fertilizer to 150 kg ha^{-1} resulted in a 14% increase of grain yield. A negative effect of pigweed density on all studied traits except grain number per head was significant with a pigweed density of 8 plants m^{-1} having the most negative effect on grain yield with 28% reduction.

Keywords
competitions, nitrogen, weed density, red root pigweed, safflower

Climate change and increasing weed infestation in the Mediterranean area

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Climate change has a strong impact on both the geographical distribution and the incidence of weed infestation. In the Mediterranean area, drought conditions and warmer temperatures will alter the competitive balance between crops and some weed species. So far, there are few data about eco-physiological aspects of weeds such as pigweed and thistle in Mediterranean area, which are becoming very aggressive in semiarid environments. The objective of this study was to analyze effects of water stress on eco-physiological aspects of pigweed (*Amaranthus retroflexus* L.) and thistle (*Cirsium arvense* L.) at field level by measuring the photosynthetic capacity, growth and leaf water potential of pigweed and thistle in a Mediterranean area. Pigweed and thistle were studied within a naturally occurring weed population in a bell pepper field, where a rainfed treatment was compared to a fully irrigated. Soil water content, net assimilation rate (A), stomatal conductance (gs), transpiration rate (T) were determined on pigweed and thistle leaves. In drought conditions there was no difference in terms of midday leaf water potential between pigweed and thistle, but gas exchange parameters and water use efficiency were different, obviously for different photosynthetic pathway, but also for different water use strategy. In Mediterranean irrigated fields weeds in mixed stands compete with crops, faster growing C4 weeds as pigweed prevail on slower-growing C3 species, both weeds and crops. Even if competition between weeds and crops is greater with increasing water, in relative terms there is greater relative competition with limited water resources.

Keywords
climate change, drought, weeds ecophysiology

Allelopathic potential of some invasive woody plant species occuring in Hungary

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Allelopathy may play an important role in the invasion success of adventive plant species. The aim of this study was to determine the allelopathic potential of most invasive woody plant species occurring in Hungary. Juglone index of fourteen invasive woody plant species in Hungary was determined by the method of SZABÓ (1999), comparing the effects of juglone and substance extracted of plant species with unknown allelopathic potential on the germination rate, shoot length and rooth length of white mustard (*Sinapis alba* L.). Results have proven a more or less expressed allelopathic potential in case of all species. The juglone index at higher concentration extracts (5 g dry plant material extracted with 100 ml distilled water) of almost every studied species approaches to 1 or is above 1, this means the effect of the extracts is similar to juglone or surpasses it. In terms of juglone index, the allelopathic potential of false indigo (*Amorpha fruticosa* L.), tree-of-heaven (*Ailanthus altissima* [Mill.] Swingle) and hackberry (*Celtis occidentalis* L.) were the highest. Besides these species the treatment with the extracts of black walnut (*Juglans nigra* L.), black cherry (*Prunus serotina* Ehrh.) and green ash (*Fraxinus pennsylvanica* Marsh. var. *subintegerrima* [Vahl] Fern.) reduced extremely significantly the germination rate, shoot and root length, compared to the control. In vitro researches are suitable for determining the allelopathic potential, but allelopathy should be proven under field conditions too, that is why we are going to investigate the allelopathic effect of above-mentioned invasive species on oak seedlings in seed-orchard.

Keywords
invasive species, allelopathy, juglone index, germination inhibition, growth inhibition

Phytotoxicity of *Nicotiana glauca* Graham aqueous extracts, a Tunisian invasive plant

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Phytotoxicity of aqueous extracts of a Tunisian invasive plant (*Nicotiana glauca* Graham), was evaluated on seed germination and seedling growth of two crops (*Lactuca sativa* L. [lettuce] and *Raphanus sativus* L. [radish]) and two weeds (*Peganum harmala* L. [Peganum] and *Cynara cardunculus* L. [cardoon]). Target species were grown on Petri dish supplemented with 5 ml of aqueous extract prepared at 10, 20, 30 and 40g/l, extracted from leaves, flowers, stems, roots and fruit of *N. glauca.* Aqueous extracts of stems, roots and fruit had no effect on seed germination of tested crops at all concentrations, but they decreased the seed germination of target weeds. Percentage inhibition varied between 37 and 100%. Leaves and flowers extract, inhibited seed germination and seedling growth of all target species. The inhibition was proportional to aqueous extract concentrations. Root length inhibition was more obvious than shoot length. Significant inhibition of root length at almost all concentrations in all the bioassay species showed that root length is a more sensitive indicator of phytotoxic activity. The percentage of reduction in germination and seedling length was significantly higher in weed plants compared to crops. The degree of phytotoxicity of different *N. glauca* parts is ranked in the following order of inhibition: leaves = flowers > fruit > stems > roots.

Keywords
Phytotoxicity, invasive plant, *N. glauca,* aqueous extracts, crops, weeds, inhibition

Phytotoxicity of *Thymelaea hirsuta* L.

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Invasive plants are a widespread problem but the mechanisms used by these plants to become invasive are often unknown. Production of phytotoxic natural products by invasive weeds is one mechanism by which these species may become successful competitors. This study reports the phytotoxic potential of *Thymelaea hirsuta* L. through incorporating leaves, flowers, shoots and roots biomass into soil (12.5, 25, 50 g/Kg) and irrigation by their aqueous extracts (50g/L), on the growth of two crops (*Lactuca sativa* L. and *Raphanus sativus* L.) and two weeds (*Peaganum harmala* L. and *Scolymus maculatus* L.). Results revealed a perceptible phytotoxic effect which increased with dose and concentration. At the highest dose, leaves residues was most toxic and caused total inhibition of lettuce seedlings growth. Flowers and shoots residues exhibited an average inhibition of 94% and 84% for, respectively, roots and shoots length of target species. Irrigation with aqueous extracts of *T. hirsuta* different organs decreased also seedlings length of all test species. Aqueous extract of leaves was the most inhibiting of roots growth, it induced a significant average reduction of 70%, while a slight reduction was varied between 9% and 52% for shoots growth. Results of the present study suggest that different organs of *T. hirsuta* L. would be rich in natural bioactive substances that could be exploited in the management of agro-ecosystems, as an alternative to industrial inputs.

Keywords
T. hirsuta, phytoxicity, seedling growth

From plant traits to invasion success in *Fallopia japonica* Houtt

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Invasive plant species can cause radical changes in native plant communities and the functioning of ecosystems; they can lead to homogenization of biota and species extinctions. However, it is difficult to predict the effects of invaders on ecosystems, since these vary according to the traits of the invading species, and the properties of the invaded vegetation and habitat. A number of studies clearly demonstrate the negative effect of *F. japonica* (an E-Asian invasive perennial herbaceous plant) on biodiversity, i.e. native flora, invertebrate assemblages, on topsoil mineral nutrient concentrations, and on economy. This species is recognized as a highly invasive noxious weed in its invaded area and is included in the List of the 100 world's worst invasive alien species. The aims of the study were to define relevant functional traits of *F. japonica* in its introduced range, and to investigate the effects of the species on native plant species richness and diversity. The research was conducted in Piedmont region, Italy, in 2010 and 2011. Mechanisms by which the invasive plant is able to alter ecosystem properties and processes were studied through analysis of some functional traits within the native plant community compared to the traits of the invader. A high relative growth rate, specific leaf area, biomass production, quality of litter and decomposition rate were found to be associated to the species' invasion success.

Keywords
invasion success, *Fallopia japonica*

Session 2

Agricultural weeds and plant invaders: biology, ecology, what can we learn from each other?

Oral presentations

Keynote

The 'weedy' traits of invasive alien plants

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In 1965, the American plant ecologist Herbert Baker compiled a list of the characteristics of an ideal weed. This list included traits such as fast and profuse germination, rapid growth, self-compatibility and a high environmental tolerance. Although this list of traits was developed for weeds, it has frequently been suggested that the same traits should also characterize the ideal invasive alien plant, particularly because many of them are considered to be weeds. Despite the long time since the publication of Baker's list, empirical multi-species studies testing the importance of species traits for invasiveness of alien plants have only started to accumulate in recent years. In this presentation, I will give an overview of the results from such large multi-species studies done by my co-workers and myself. Overall, these studies show that many of the traits of an ideal weed, such as fast and profuse germination, rapid growth, self-compatibility and high environmental tolerance, also characterize many invasive alien species. This implies that prevention and management measures should focus on alien species with such ´weedy´ traits.

Keywords
weed, invasive plant, environment

Linking species traits of alien plants with environmental characteristics of agricultural habitats

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The survival and success of alien plant species is determined by species traits (i.e. invasiveness) and the characteristics of the habitats in the region of introduction (i.e. invasibility). Species traits are known to vary according to the habitat characteristics. However, empirical studies of the species traits in plant invasion success have largely ignored the environmental conditions of the habitats. We quantified the invasion level of neophyte alien plant species in five agricultural habitats in Finland and identified the environmental factors affecting the occurrence of alien species. In addition, we assessed the interaction of environmental factors and life-history traits for alien plant species using RLQ analysis combined with K-means clustering method. We found that temperature, geographical location and disturbance regime of the habitats contributed to the occurrence of alien plant species in agricultural habitats. Of the species traits, strategy type, invasion history (natural distribution area, pathway of introduction, date of first observation), traits related to dispersal (dispersal type, seed mass) and habitat preferences moisture, nitrogen and soil acidity were most consistently associated with alien plant species. These species traits were significantly associated with the environmental variables. All clusters were phylogenetically independent. Thus, the clusters of alien species comprised species of diverse taxonomic affinities, although they shared the traits explaining their occurrence in particular habitats. This information is useful for understanding the link between species traits and the environmental conditions of the habitats, and complexity of the invasion process.

Keywords
Clustering, RLQ analysis, invasions, life-history traits

The Riddle of *Gunnera tinctoria* Invasions: a Particularly Irish Enigma

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Gunnera tinctoria invasions represent an often identified enigma: why should a species with a narrow ecological amplitude have the capacity to become such a significant invader? In Ireland, for instance, it is now recognised as one of the top thirteen invasive species. Consideration of its ecophysiology indicates that it should never be able colonize areas with even mild water deficits, although the impact of other important environmental factors is unclear. Habitat-mapping of *G. tinctoria* in the West of Ireland indicates a preference for anthropogenic habitats. Rather surprisingly, colonization of organic soils, the dominant soil type in this region, is poor. Analysis of *G. tinctoria* populations indicate that invasive populations are genetically distinct and that gene flow may be an important factor contributing to invasive success. Stochastic evolutionary processes alone can explain the observed genetic variation, with no need for adaptive evolution. Genetic analysis, in conjunction with computer-based modelling, indicates that seed dispersal is the primary method for long-distance propagule dispersal, despite the initial belief that this species propagates solely asexually. Few seeds germinate, although they remain viable, with germination constrained by low soil temperatures. Projections of the impact of climate change on the future success of this species indicates that its distribution is likely to increase by the end of the century, with habitat-type playing the more significant role. Overall, these results indicate how little we know about what contributes to successful invasions and the significance of complex relationships among plant traits, habitat and climate.

Keywords
Gunnera tinctoria, water deficits, genetics, habitat factors

Morphological and molecular identification of invasive and autochthonous *Vitis* taxa along Hungary

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North-American *Vitis* taxa especially *Vitis riparia* Michx. (riverbank grape) have been used as grapevine rootstock since the end of the XIXth. century, when phylloxera (*Viteus vitifolii* Fitch.) spread and destroyed in the European vineyards. Riverbank grape is tolerant against the phylloxera, and the two most dangerous pathogens: powdery mildew *(Erysiphe necator)* and downy mildew ***(Plasmopara viticola)*** which endanger the autochthonous, protected grape taxon: *Vitis sylvestris* C.C. Gmel.. Because of these advantageous characters and the invasive being of V. riparia Michx. this plant spread from the abandoned vine plantations to the vegetation and displace the natural wildgrape populations in it's natural habitat. The hybrids of *Vitis sylvestris* C.C. Gmel. × *Vitis riparia* Michx. inherit the invasive growing and the main morphological and physiological characters of the riverbank grape. These invasive plants are difficult to different from the native wildgrape. In order to protect the *Vitis sylvestris* C.C. Gmel. it's morphological and molecular identification is absolutely necessary. In this work 20 morphological patterns and and 8 variable SSR markers have been used for the characterization of the natural *Vitis* taxa in the Hungarian habitat. Data evaluations of morphological and molecular investigations were made with NMDS (Non-metric multidimensional scaling) analysis. In case of the morphological method, the erected hairs on the lower side of the leafs and on the petiole proved to separate the different species. The molecular SSR method is also effective to differentiate between the invasive taxon and the native wild grape populations.

Keywords
wild grape, ampelometry, microsatellite, NMDS

Biogeography of the invasive grass *Bromus tectorum* in its native range: stochastic range expansion influences genetic diversity and genetic structure

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The amount and distribution of genetic diversity of invasive species in their native range is influenced by the biogeographic and evolutionary history of these species. For invasive species of European origin, Pleistocene glaciation likely represents the most important biogeographic events shaping genetic diversity. The genetic consequences of Pleistocene glaciation can be described by two alternative scenarios: the expansion/contraction (E/C) hypothesis, and the genetic admixture hypothesis. We examined the predictions of these two hypotheses by assessing the microsatellite DNA diversity of 41 native European populations of the invasive annual grass *Bromus tectorum* L. Populations from southern Europe (Spain and Italy) possess, on average, more genetic diversity (A = 1.26 and %P = 26.0) compared with population from either central (A = 1.10 and %P = 8.6) or northern (A = 1.06 and %P = 5.9) Europe. These findings are in general agreement with the E/C hypothesis and suggest that, at the population level, *B. tectorum* experienced a reduction in genetic diversity as the species' post-glacial range expanded from Mediterranean refugia. At the population level, our data does not support the genetic admixture hypothesis. However, populations from across northern Europe possess greater allelic richness compared with populations from southern Europe. This result suggests that populations of *B. tectorum* from northern Europe exhibit genetic admixture; however this admixture is manifested at the regional level, and not at the population level. Additionally, the genetic diversity of European populations of *B. tectorum* exhibits high genetic structure; this diversity however is not geographically structured (i.e., no isolation by distance pattern was observed). The genetic diversity of *B. tectorum* in its native range appears to be the product of stochastic range expansion during the post-glacial time period, and more recently as agricultural development took place in central and northern Europe.

Keywords
Genetic diversity and structure, native range populations, expansion/contraction hypothesis, genetic admixture

Growth, reproduction and plant damage of *Cirsium arvense* in its native and invasive range

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Observational studies in *Cirsium arvense* were done in Czech Republic (Europe) and Nebraska (USA), native and invasive ranges, between 2005 and 2007, to test whether plants grow more in the invasive range and suffer less damage than plants from populations in the native range, as the Enemy Release Hypothesis states. To have more accurate results we afterwards experimentally tested for direct and indirect effects of non-overlapping herbivore insects on plant growth and reproduction. We compared this effect between plants from the native (Spain and the Czech Republic, Europe) and invasive range (Nebraska and Illinois, North America). In a common garden experiment, herbivore insects were added alone and in combinations to *C. arvense* which were planted in the Czech Republic in March 2008 and grew from seeds for two growing seasons. One underground insect *(Cleonis pigra)* and 3 aboveground insect species were used *(Cassida rubiginosa, Rhinocyllus conicus, Urophora cardui).* Results from observational studies indicate that in its native range, *C. arvense* experiences more plant damages and grows less than in the invasive range. Results from the experimental study also show that plants from the invasive range grew more than the ones from the native range. Plants to which herbivores were not added were bigger than plants to which herbivores were added, showing a negative effect of insects on plant growth. The effect of combined insect was bigger than the single additions, suggesting a combination of more insects would maybe a better solution for in biological control of *C. arvense.*

Keywords
Cirsium arvense, herbivore insects, native and invasive range, weed control, plant growth

Differences in population dynamics between native and invasive *Centaurea stoebe*: the role of life cycles and the impact of specialist herbivores

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Introduced organisms may experience major changes in their new environments, which could favour pre-adapted genotypes and/or promote rapid evolution. For plants, the release from natural enemies in a new range might cause changes in plant defence and life history with consequences for plant-antagonist interactions and biological control. In *Centaurea stoebe* L. (Asteracae) two cytotypes occur in the native range in Europe differing in life cycles: monocarpic, biennial diploids (EU2x) and polycarpic, perennial tetraploids (EU4x). Drivers for the evolution of this variation in life cycles might be root-feeding insect herbivores selecting for monocarpy. However, in absence of herbivores polycarpy might be advantageous which could explain the observed shift in cytotype distribution towards exclusively tetraploids (NA4x) in the introduced range in North America. In a 3-year common garden experiment we studied the population dynamics of the three geo-cytotypes (EU2x, EU4x, NA4x) in absence and presence of the specialist root-feeding moth *Agapeta zoegana*, which has been introduced as a biocontrol agent 25 years ago. Preliminary results revealed only a small increase of population growth in polycarpic EU4x compared to monocarpic EU2x in absence of herbivores, in contrast to a pronounced increase in NA4x compared to EU4x. This provides strong evidence for rapid evolutionary change promoting the success of NA4x, while polycarpy itself playing a minor role. Unexpectedly, in presence of herbivores population growth increased in native cytotypes, but decreased in NA4x. This differential effect might indicate changes in plant defence between native and invasive cytotypes, which may result in increased biocontrol efficacy.

Keywords
demography, life history, herbivores, biological control, rapid evolution

Session 2

Agricultural weeds and plant invaders: biology, ecology, what can we learn from each other?

Posters

Distribution of Parthenium (*Parthenium hysterophorus* L.) Weed in Peshawar Valley, KPK-Pakistan

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Parthenium weed was probably introduced in Pakistan in 1980s through India where it was reported much earlier. It is a recent introduction in Islamabad and it is becoming a major weed of cropped and non-cropped areas of KhyberPakhtunkhwa and Punjab provinces of Pakistan. Field survey of four districts of the Peshawar valley, KPK viz. Swabi, Mardan, Charsadda and Peshawar were carried out during May–June, 2009–2010 to study the distribution and invasion of Parthenium weed. The mean data across the surveyed districts revealed that the flora was predominated by Parthenium weed with the highest relative density of 42.68% among all species. It was followed by *Cannabis sativa, Cynodon dactylon* and *Cyperus rotundus,* with relative densities of 15.17, 13.49 and 5.96 respectively. At different locations it was observed that Parthenium weed was competing with *Cannabis sativa* which is not so aggressive and problematic weed. While in some areas they have already replaced *Cannabis sativa. Rumex crispus* and *Xanthium strumarium* infatuated the smallest relative frequency at most of the locations studied thereby indicating them as insignificant among the weed flora of the study area. Importance value data revealed that *Parthenium hysterophorus, Cannabis sativa, Cynodon dactylon* and *Coronopus didymus* having IV% of 34.41, 16.30 13.42 and 7.14, respectively. Looking at the overall distribution of flora in Peshawar valley Parthenium weed is spreading rapidly along the roadsides, into agricultural fields and on wastelands. The dominance of Parthenium can be attributed to its allelopathic properties, its higher growth rate, its rapid flowering and its higher fecundity.

Keywords
Invasive weed, *P. hysterophorus,* weed communities, Peshawar valley, KPK

Genetic variation and population structure of invasive plant species *Erigeron annuus* in Lithuania

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The aim of this study – to assess the level of genetic diversity of exotic herbaceous plant species *Erigeron annuus* in Lithuania. *E. annuus* is widely spread in south and southeastern part of the country. The global climate changes and changes in agricultural practice in the past few decades were favorable for the spreading of this exotic plant species. We used RAPD and ISSR techniques to provide estimates of the comparative genetic variation within and among populations of *E. annuus*. After initial screening, reliable RAPD and ISSR markers were developed. Using these markers, the percentage of polymorphic loci, Nei's gene diversity, Shannon's information index and gene differentiation coefficient were established in 25 populations of this invasive weed. Analysis of DNA markers conducted using AMOVA showed high genetic differentiation among populations. Breeding system had a very strong impact on the level of genetic variability. Identical RAPD phenotypes were established among plants of different populations of this apomyctic species. Significant differences in DNA polymorphism among populations of *E. annuus* were also found. Some populations of this species are composed of genetically identical plants, while others were rather polymorphic. Similar patterns of genetic variation were found using both types of DNA markers but UPGMA cluster analysis showed a slightly different grouping of genotypes.

Keywords
Erigeron annuus, molecular markers, invasive plant species, population genetic structure

Effect of wild mustard *(Sinapis arvensis)* density on some agronomic traits of canola *(Brassica napus)* cultivars

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In order to study effect of wild mustard interferences in some canola cultivars two field experiments were carried out at the Gorgan Institute in Iran during the 2005–2007 cropping seasons. The experimental factors were canola cultivars (1st year: Zarfam, Option500, Hayola330, Hayola401, Talayh, Rgs003 and Sarigol; 2nd year: Zarfam, Hayola330, Rgs003 and Option500) and weed density (1st year: control and 30 plants m-2; 2nd year: control, 4, 8 and 16 plants m-2). seed yield, harvest index, number of siliques/plant, number of seed/silique, 1000-seed weight, seed oil percentage and nitrogen harvest index were measured. Results showed significant differences in seed yield between cultivars. Results also indicated significant differences in yield components and weed-infesteded conditions, but interference had no drastic effect on seed oil percentage and 1000-seed weight. In first year and under weed-free condition, the highest and lowest seed yield with averages of 2836 and 1729 kg/ha belonged to Cultivars Hayola330 and Talayh, respectively. But under weed infested condition, Cultivars Hayola330 and Option500 produced the highest and lowest seed yield with averages of 870 and 101 kg/ha, respectively. In second year and under weed-infested conditions, the lowest and highest yield loss percentage with averages of 42 and 88% belonged to cultivars Zarfam and Option500, respectively. Increasing wild mustard density decreased canola seed yield, biological yield with a nonlinear trend. The results of this study suggest that competitive canola cultivars may be best suited for use in an integrated weed management program, particularly for farmers of organic or low input cropping systems.

Keywords
Canola, Wild mustard, Yield, Weed density, Oil percentage, Yield components

Germination ecology of *Rhynchosia capitata* (Roth) DC: An alien invasive summer season weed.

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Experiments were conducted to study the seed germination patterns of *Rhynchosia capitata* (Roth) DC, an emerging weed in Pakistan. We investigated whether the diverse ecological factors such as temperature, salinity, drought stress, pH, soil depth and darkness affect the germination of *R. capitata.* Germination decreased as the temperature increased from 25 °C and completely inhibited at 45 °C. Presence or absence of light did not influence germination. Germination of *R. capitata* was sensitive to increasing salt and drought stress as well as seed burial depth. Only 47.50% of seeds germinated at a NaCl concentration of 150 mM as compared to 100% in 0 mM of NaCl concentration. Similarly, 15% of the seeds germinated at drought stress level of –0.8 Mpa as compared to 87.5% at –0.2 Mpa level. In seed burial depth trials, maximum seedling emergence 92.50 % was at 2cm depth. The optimal pH for seed germination of *R. capitata* was 7 (97.5 %), but the seeds also germinated at lower level of pH 5 (85%) and at higher level of pH 10 (75 %). The high germination ability of *R. capitata* under a wide range of treatments suggests that this species is likely to be the most problematic in near future if not managed appropriately.

Keywords
drought stress, salinity, seedling, emergence, burial depth

Growing potential of the non native invasive weed *Pueraria lobata* (Willd.) Ohwi, in South Switzerland – a methodic approach

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Pueraria lobata (Kudzu) occurs in the canton Ticino territory since more than a decade. In 2006 approximately 24 outbreaks have been observed. These locations are not monitored by authorities despite the plant's presence in the black list of invasive species of the Swiss Commission for Wild Plant Conservation CPS/SKEW which determines that establishment and spread should be prevented. In 2010 a field trial has started to determine the growing potential of Kudzu under field conditions in the Magadino Plain, which is the most representative cropping area of Ticino. Twelve plants comparable in age and size, formerly produced from offshoots of mother plants which were collected in an infested area in Ticino. After a quality evaluation shoots were planted in large pots which were buried in the soil to avoid local outbreak. A water control system has been installed to put the plants under standard growing conditions. Several parameters were measured. Overwintering rate, growing of leaves, stems and roots, number of leaves, flowers and stems, length of the stems and leaf area index LAI. An official Swissmeteo station nearby the trial location recorded most of the important plant growing factors of climate and soil. This method allowed to start with quite homogeneous plant material with a 100% surviving rate. Growing parameters were assessed and showed important evolutions after a short stagnating period. The most important growing data was observed in length growing of the stems and number of developed leaves.

Keywords
Invasive weed, *Pueraria lobata,* Ticino, Growing Potential

Soybean (*Glycine max* [L.] Merr.) cultivars and *Abutilon theophrasti* canopy profiles

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A field study was undertaken to examine profile of leaf area and dry matter of soybean cultivars and weeds. The experimental design was a randomized complete block using a split-plot arrangement with three replications. Main plots were weedy and weed free, and subplots were six soybean cultivars. At soybean canopy closure stage, sampling of leaf area and dry matter profile of cultivars and weeds was carried out. Interference with weeds caused different cultivars of soybean shift the maximum layer of leaf area and dry matter to the upper layer of canopy. Distribution of leaf area and biomass in weeds canopy was related to its species and the growth form. *Abutilon theophrasti* increased its height and height of branching, and spread its leaves on the soybean canopy. The hill cultivar in weedy plots produced maximum grain yield.

Keywords
soybean canopy structure, leaf area, dry matter accumulation, *Abutilon theophrasti,* yield

Potential spread of invasive plant species in Romanian protected areas. Case-studies: Comana Natural Park and Rodna Mountains National Park

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Invasive terrestrial plant species (ITPS) represent an important environmental risk to indigenous ecosystems especially when it comes to protected areas. In Romania, the ITPS currently includes more than 400 species (13.87% of the Romanian flora), among which, within the protected areas, some of the most representative are: *Ailanthus altissima, Acer negundo, Amorpha fruticosa.* The paper is aiming to analyze the key natural driving forces responsible for the spread of the invasive plant species in the Romanian protected areas: relief, lithology, soil, climate, hydrology, vegetation etc. This assessment will focus on two relevant case-studies: Comana Natural Park, V IUCN category specific for the plain region (Romanian Plain, southern Romania) and Rodna Mountains National Park, II IUCN category (biosphere reserve since 2001) particular for the mountain region (Eastern Romanian Carpathians). Both are Natura 2000 sites (SPA and SCI). Taking into consideration their ecological significance, the authors intend to make a complex assessment of the ITPS which is affecting the ecological balance of these protected areas. Firstly, a GIS-based inventory and the distribution maps of the ITPS for both protected areas will be created. Based on each specie ecological requirements one could draw up the conceptual model of assessing the key natural driving forces for the ITPS in order to identify their introduction pathways and ultimately, their expansion potential. Based on this assessment, the authors seek to identify the impact ITPS have upon the natural habitat of some rare species, especially when talking about protected areas of high conservation value.

Keywords
expansion potential, Invasive Plant Species (IPS), Romanian protected areas, Comana Natural Park, Rodna Mountains National Park

Management of Invasive Species in Assam, India with Special Reference to Manas Biosphere Reserve

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The grassland in protected areas of Assam, known as key habitats of several globally endangered species like Indian Rhinoceros, Asian elephant, Royal Bengal tiger declined drastically due to phytoinvasion of several unwanted species. A model study was carried out in Manas Biosphere Reserve to focus the problem of phytoinvasion in grassland and designing practical management recommendation. Grassland model designed by multivariate analysis indicated presence of major invading species like *Leea asiatica* (L.) Ridsdale and *Bombax ceiba* L. besides *Chromolaena odorata* (L.) King, *Plectranthus ternifolius* D.Don. in selected area. Continued anthropogenic disturbances resulted increase of weeds. The management of invading species through different low cost strategies like mapping of weeds, control burning, protection to degraded grassland, early burning to escape seed dispersal of *Bombax ceiba,* grazing of Asian elephant for biological control of *Leea* and *Bombax,* biomass sharing of invasive species and grass during fire line creation, late burning treatment in selected sites are significant strategy for management of invasive species. The direct involvement of tribal community in conservation campaign has resulted converting hardcore poachers to conservation worker to protect grassland biodiversity, implementation of management recommendation to control invasive species and minimizing cost of park management.

Keywords
Burning, Biomass sharing, Biological control, Community

Exploring the Flora on Inert Landfill Sites in Southern Ticino (Switzerland)

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Results of a floristic survey conducted in eight deposits of inert materials and landfill sites in southern Canton Ticino are presented. 512 taxa belonging to 297 genera and 85 families were recorded during 2009. An overall amount of 83 (16.2% of total) neophyte taxa were identified on the studied sites, among which several taxa not recorded in the Swiss floras. Species richness and composition demonstrate the role of inert landfill sites as privileged sites of early arrival for adventive taxa new to the Swiss flora, as sites of proliferation and starting points for further spread of invasive alien plants and as substitution habitats for threatened and rare native plants. Underlying mechanisms and conditions explaining species composition and the distribution of some noteworthy taxa are discussed. Results are compared with floristic surveys of railway areas in the same region.

Keywords
Flora, floristics, biodiversity, adventive, neophytes, invasive, landfill site, Ticino

Studies of genetic diversity of an invasive species *Lupinus polyphyllus* Lindl. in Lithuania

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Lupinus polyphyllus Lindl. (Fabaceae) is one of the noxious alien species that alters the species composition of natural plant communities. In Lithuania this species was for the first time recorded in 1931. Presently it is spread in many places near the roadsides and wood outskirts, near major highways and in former grazing areas. Its spread in Lithuania was stimulated by the fact that it had been sown in forests as food for wild animals and as a precautionary measure against the spread of forest fires. It is noted that recently the species aggressively expanses from the outskirts of coniferous forests and roadsides into open, abandoned and uncultivated fields. This poses a potential threat to natural plant communities, biodiversity and the Lithuanian landscapes. Genetic diversity of lupine populations of forests and forest outskirts has been studied using the RAPD method; intraspecific and intrapopulational genetic diversity were defined. Polymorphism was detected with six primers. The UPGMA dendrogram revealed that all plants are genetically different, but individuals of each population group together. AMOVA showed significant genetic differentiation of the investigated *L. polyphyllus* populations. Principal coordinate analysis also showed grouping of individuals of the same population. The genetic distance between forest populations of lupine was lower than of the forest and field populations. Our research on *Lupinus polyphyllus* diversity in Lithuania revealed genetic peculiarities of lupine populations; probably, this could be due to adaptation strategies of this species and their local adaptation. Although *L. polyphyllus* becomes one of the most aggressive invasive plant species, but this is only the first study on genetic diversity of this species in Lithuania.

Keywords
Lupinus polyphyllus, genetic diversity, RAPD

A study on biology and phytosociology of the invasive plant: *Grindelia squarrosa* (Pursh) Dunal. (Asteraceae) in Romania

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Grindelia squarrosa, originating in North America, has been reported as naturalized in Eastern Europe, since the middle of last century. In Romania, presumably it has been unintentionally introduced from the former USSR, with goods or passenger trains. Nowadays, it is spread in the Eastern Romania, in surroundings of two large cities (Iaşi and Galați), placed at ca 250 km away from each other. Into these areas, *G. squarrosa* is in a continuous increasing of the populations size, from few dozens of square meters (14 years ago) to several thousand of square meters (today). The density of populations, their age structure, and spatial distribution were estimated in field plots. *G. squarrosa* showed a high reproductive capacity, up to 76,000 achenes / individual / year. It is known that disc and ray achenes are morphologically distinct in this species, and they differ in germination rate. Our results confirm this germination polymorphism. *G. squarrosa* is a biennial species, diploid or tetraploid. In Romania, it has a pioneer status into the open, highly degraded, ± dry habitats, along the roads and railways, on the embankments, and other ruderal places, invading ruderal plant communities, especially from the Dauco-Melilotion alliance. Analysis of the invaded habitats revealed that *G. squarrosa* is a heliophilous, thermophilous and xerophilous plant species. Although currently the invasion of this species into agricultural crops or native plant communities has not been proven in Romania, this trend is not excluded in the future, given its behaviour in the neighbouring countries.

Keywords
Grindelia squarrosa, invasive alien plant, Romania

Accumulation of heavy metals in *Fallopia japonica* (Houtt.) Ronse Decraene.

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The expansion of Japanese Knotweed into polluted areas animates the interest of its resistance to heavy metals. To investigate *Fallopia japonica* response to Cd, Cr, Cu, Zn and Pb a greenhouse experiment was carried out. Plant material was collected from polluted sites of Wroclaw city Rhizomes were planted into pots with soils polluted by four different doses of each metal. During the study it was observed dynamic of growth and noted symptoms suggesting toxic effect of metals on *Fallopia japonica.* It was also measured concentrations of heavy metals in plant material. Rhizomes and leaves have been treated separately as different parts of plants cumulating heavy metals. The results of study suggest that *Fallopia japonica* is resistant to heavy metals. The tolerance to led, chromium and mercury was especially high. Heavy metals were accumulated in rhizomes mainly. It limited their transport into aboveground parts of plants. The outcomes lead to conclusion that a tolerance of Japanese Knotweed to heavy metals can facilitate their expansion into polluted areas.

Keywords
Fallopia japonica, heavy metals accumulation, heavy metals resistance

Prediction spatial distribution patterns of *Cardaria draba* (L.) using learning vector quantization artificial neural network (LVQANN)

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Recent advances in precision farming technologies have triggered the need for highly flexible modelling methods to estimate, classificate and map weed population patterns for using in site-specific weed management. In this research, a learning vector quantization neural network (LVQNN) model was developed to predict and classify the spatial distribution of *Cardaria draba* (L.) density. This method was evaluated on data of *C. draba* (L.) density in a wheat field located in Boshrooyeh, Southern Khorasan, Iran, in 2010. Some statistical tests, such as comparisions of the means, variance, statistical distribution were used between the observed point sample data and the estimated weed density surfaces to evaluate the performance of the pattern recognition method. Results showed that in training LVQNN, test and total phase P-value was greater than 0.9, indicating that there was no significant difference between statsitcal parameters such as average, variance, statistical distribution in the observed and the estimated weed density. This results suggest that LVQNN can learn weed density model very well. In addition, results indicated that trained LVQNN has a high capability in predicting weed density with recognition accuracy of 100 percent at unsampled points. The technique showed that the LVQNN could classify and map *C. draba* (L.) spatial variability on the field. Our map showed that patchy weed distribution offers large potential for using site-specific weed control on this field.

Keywords
Classification, Map, Learning vector quantization, Neural network, Patchy distribution

Genetic characteristics of populations of *Impatiens glandulifera* growing in some Baltic areas

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In Western Europe naturalisation of *Impatiens glandulifera* took place since 19th century, while in Northern Europe this species has spread later. In Lithuania, for the first *I. glandulifera* was recorded in 1959, while presently it is distributed through all the country. No accounts exists for evidence of local differentiation concerning *I. glandulifera* in the Baltic region. The objective of this study was to evaluate genetic variability of Lithuanian populations of *I. glandulifera.* In this country ditches, backyards, abandoned estates or landfills are the most common surroundings for *I. glandulifera* while wet natural habitats such as riverbanks or lakesides are less frequent localities. *Urtica dioica, Phragmites australis* are the most common neighbours of this species. The biggest amount of populations was registered round the first record place in Jieznas. Nineteen populations of *I. glandulifera* were characterised by the random amplified polymorphic DNA method using 250 and OPA-20 primers. For separate population the percentage of polymorphic loci ranged in the interval 15–78 and the number of polymorphic loci respectively was 8–43. Pair-wise genetic distance among individuals in these populations ranged from 0.104 to 0.481. Geography of the populations did not have more exact reflection in RAPD based principal component analyses also UPGMA dendrograms. Presumably two different ways of invasion of *I. glandulifera* took part: natural run and predisposing it dispersal by human. Changes in genetic structure might occur during and after the course of an invasion of populations: according to our study expressed differences in genetic structure were determined for Lithuanian populations of *I. glandulifera.*

Keywords
Balsaminaceae, genetic polymorphism, neophytes

Interrelations between genetic variability and geographical distribution of Lithuanian *Impatiens parviflora*

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Suprisingly little information is available about adaptations of invasive species in many countries of north-western Europe. It is supposed that in Lithuania *Impatiens parviflora* escaped from the Botanical Garden and in 1934 for the first it was recorded in suburbs of Vilnius. Presently *I. parviflora* belongs to naturalized species of active distribution. Our study aimed at evaluation of relations between genetic variability and geographical distribution of *I. parviflora* growing in Lithuania. In Lithuania, *I. parviflora* occurs abundantly in disturbed by human localities – urban sites, roadsides or farmyards. Permanently overmoistured gleyic forest sites are also common habitats for *I. parviflora. Galium aparine, Aegopodium podagraria, Rubus caesius* are very frequent neighbours of this species. RAPD as the most ubiquitous and suitable for plant analysis molecular marker was selected for evaluation of genetic diversity of *I. parviflora* populations. Thirty RAPD primers were tested, usefull appeared to be following ones: OPD-20, OPQ-11, 269, 250, 222, 474, 516, OPB-7, OPA-20. For each population the percentage of polymorphic loci was 21–27 and the number of polymorphic loci ranged in the interval 91–106 while the number of private loci was 12–23. Molecular variance among populations was much higher than within populations. Near the western, southern northen and eastern borders of Lithuania growing populations of *I. parviflora* were distinct enough according to the RAPD based principal component analyses also UPGMA dendrograms. Pair-wise genetic distance among these populations ranged from 0.349 to 0.583. Data obtained show that geographical distribution of invasive species might have reflectance in their genetical structure.

Keywords
Invasion, Balsaminaceae, RAPD, genetic diversity

Euphorbia davidii Subils (Euphorbiaceae), an agricultural emerging invader in France ?

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Euphorbia davidii Subils was first recorded in a vineyard in the South of France in 1997. It was initially confused with *Euphorbia dentata* Michx., a closely related species of the subgenus Poinsettia. It remained localized and casual for years but in 2006, a second introduction spot was detected in Burgundy in a wildlife-friendly set-aside (sown with maize). Since then, it has been found in 6 locations in France, presenting a scattered distribution from the South-West to the Center-East of the country. *E. davidii* occurs in two main kind of habitats: agricultural fields (mostly maize or soybean) and along roadsides and other related ruderal habitats. It has also been recently recorded from several European countries and thus may present a potential for invasiveness. We review the localization, the habitat occupied and the status of the species in Europe, with a special focus on France. In order to facilitate early detection we present its main taxonomic features allowing easy recognition. A rapid risk assessment has been performed which indicate that the species present an intermediate risk requiring further observations. If its potential to become both an environmental weeds is still unclear, it has more probably the potential to become a noxious agricultural weed in summer-sown crops. We therefore stress on the importance of following the spread of this species in France and Europe. We emphasize on the importance of agricultural fields as potential introduction entrances for biological invasion.

Keywords
Euphorbia davidii, agricultural invader, emerging species, France

Genetic diversity in native and invasive populations of *Taeniatherum caput-medusae* ssp. asperum (medusahead): evidence for multiple introductions, source populations and founder effects

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The native range of *Taeniatherum caput-medusae* (medusahead) includes much of Eurasia. Medusahead, a primarily self-pollinating annual grass, was introduced into western U.S. in the late 1800s. In the current study we compared allozyme diversity in native and invasive populations of medusahead to: test the multiple introduction hypothesis, identify source populations for the U.S. invasion, and determine the genetic consequences of these events. Five of the seven homozygous multilocus genotypes previously observed in the western U.S. have been detected in native populations; thereby providing support for the multiple introduction hypothesis. Source populations for these introductions appear to have been drawn from France, Sardinia, Greece and Turkey, although additional analyses are ongoing. Across native populations, 17 of 23 loci were polymorphic and a total of 48 alleles were detected, while only five polymorphic loci and 28 alleles were found among invasive populations. On average, invasive populations possess reduced within-population genetic diversity, compared with those from the native range. While U.S. populations have experienced founder effects, 38% (17 of 45) these populations appear to be genetic admixtures (consisting of two or more native genotypes). Results of this study have implications for the biological control of medusahead: i) the search for effective and specific biological control agents will have to occur broadly across the species' native range, ii) multiple agents may be required to control invasive populations that are admixtures, and iii) because invasive population are genetically depauperate, highly adapted biocontrol agents are likely to be quite effective.

Keywords
medusahead, founder effects, genetic diversity, multiple introductions, source populations

Invasive plants on agricultural fields in Lithuania

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The immigration of alien plants takes place under the influence of human activity. The territory of Lithuania is under intensive anthropogenic influence. As much as 54% of the territory is agricultural land, large part is under the roads, railways and housing development. Disturbed plant cover cause invasion and existence of alien plants, also global change is known to influence plant invasion. Not all invasive plant species is of great significance in agricultural fields. Expeditionary survey showed that in some regions of Lithuania in winter cereals *Alopecurus myosuroides* Huds. became important. This weed species first recorded in Lithuania 1982 at the territory of live – stock farm. In conspectus of alien plant species of Lithuania (1997) got a mention, which *A. myosuroides* distributed diffusely trough the whole territory of the country and it's habitats were railways, dumps, fallow land. Absence of crop rotation, minimize of soil tillage intensity caused spread of some new problematic weeds invasive in particular. As new weeds should be noted *Brassica napus* L. – winter oil seed rape. *B. napus* is cultivated as oil seed rape, but in absence of crop rotation it spread as volunteer rape in cereal crops and especially unwanted in spring oilseed rape crops trough lack for implements of control. *Galinsoga parviflora* L., *Atriplex hortensis* L., *Amaranthus retroflexus* L. could be mentioned as invasive weeds in vegetable crops. It could be supposed, that with changing of environmental and economical conditions also agricultural practise consequence of invasive weed species takes more significance in agricultural crops.

Keywords
plant invasion, *Alopecurus, Galinsoga, Brassica*

Session 3

How far are control methods transferable between agricultural weeds and plant invaders?

Oral presentations

Keynote

Control of invasive neophytes: using synergies in Swiss agricultural practice

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All of the 26 Swiss Cantons run their own cantonal plant protection services (PPS). These services refer independently to their cantonal legislation and therefore also to Swiss legislation. The PPS of the Canton Zurich is a neutral office for practical questions around the agricultural plant protection. We are advisory service for farmers; we collaborate with rural communes for fire blight *(Erwinia amylovora)* and *Ambrosia artemisiifolia;* we teach young people farming and we guarantee continuing education to farmers; we advice farmers on their farm. One important task of the PPS is the control of invasive neophytes on agricultural land.
We develop specific control strategies following the directives of the Swiss confederation. We contribute our practical experiences by participating in several working groups with other cantons or within the federal administration. Furthermore we influence the development of legislation on cantonal and federal level. Examples: guideline for fire blight control or strategy of *Ambrosia* control. This year we started a project for control of *Cyperus esculentus* together with the agricultural advisory services (AGRIDEA) and the research stations Agroscope. This newly formed national working group has established ring trials in three main regions of Switzerland. Interdisciplinary collaboration was the key to success in *Ambrosia* control. A fruitful collaboration with bird seed grain producers almost stopped the invasion to residential areas where *Ambrosia* control is made by fire blight controllers. Sometimes we face limits given by the federal legislation. We cannot control *Reynoutria japonica* along waterways in an efficient way with herbicides. *Solidago canadensis* is often found on wild flower strips and demand close cooperation between agricultural and nature protection authorities.

Spread and control options of the poisonous grassland weed *Senecio aquaticus*

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In several European countries the toxic Asteraceae *Senecio aquaticus* causes problems in less fertilised, wet grassland, when fed to animals. The aim of the study is to analyse the biology of this species in regard to control options. Studies of seed bank and monitoring of plants in permanent plots under several management treatments were carried out in the Hercynian region of Lower Austria from 2005 to 2010. After germination in autumn or spring, *S. aquaticus* forms a rosette. Erect flowering shoots develop at the age of two to seven years between July and August. The majority of flowering plants die after fruit set. Achenes own a pappus facilitating wind dispersal. Based on a WDPI (wind dispersal potential) value of 6, about 10% of the seeds should reach distances of 100 m or more. We found no seeds beyond 25 m distance from mother plants. The seed bank is of persisting type, with buried seeds surviving up to 4 years at minimum. The common cutting regime (first cut in June when all plants are at rosette stage, and second cut in September after seed set) leads to accelerated population growth of *S. aquaticus.* In cutting experiments we found that two cuts at the flowering stages (July and August) helps to avoid seed set and further spread. Farmers might be able to control marsh ragwort in infected meadows, if they apply such regime accurately for several years.

Keywords
conservation, grassland weed, management, marsh ragwort, mechanical control, toxic species

Plant preference by a specialist herbivore and its parasitoid on an exotic and native plant

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Invasive plant species are recognised as a threat to biodiversity and their control is estimated costly worldwide. The range expander, *Bunias orientalis,* is a wild crucifer native to Western Asia and Southeastern Europe but in the past decades it has become highly invasive in northern and central Europe. Although different theories have been proposed to explain the success of many invasive species, little is known about the mechanisms behind plant invasion. We compared the effect of the exotic plant, *B. orientalis,* and a native related plant, *Sinapis arvensis,* on oviposition preference and offspring performance of *Pieris brassicae* butterflies. Furthermore, natural enemies may play an important role in limiting the effectiveness of herbivores to control invasive plants. We compared the flight response of *Cotesia glomerata, P. brassicae* endoparasitoid, in a two-choice test between the exotic and the native plant. In addition, we measured the parasitism rate of *P. brassicae* larvae on both host plants and the volatiles emitted by damaged plants. We hypothesize: 1) the specialist herbivore will not exhibit preference between the native and the exotic plant, because it is adapted to both plants' secondary chemistry; 2) The parasitoid will be equally attracted to the volatiles of both plants, showing a similar parasitism rate of the host. The results will elucidate if *B. orientalis* may become a potential host plant to the herbivore in medium-long term. Nevertheless, the herbivores that realise plant shift may also be subjected to top-down control by parasitoids, liberating the exotic plant from new acquired enemies.

Keywords
Bunias, Sinapis, Pieris, Cotesia, invasive plant

Host Category Defining to Mitigate *Orobanche aegyptiaca* Pers. Infestation

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Through the current study trap and catch crops culturing to decrease infestation of Egyptian broomrape (*Orobanche aegyptiaca* Pers.) were tested in PE bag and pot experiments. 27 crops; members of the Alliaceae, Zygophyllaceae, Euphorbiaceae, Pedaliaceae, Linaceae, Malvaceae, Cucurbitaceae, Chenopodiaceae, Fabaceae, Poaceae, Asteraceae 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. Two month-old 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. Through mentioned groups cotton in Malvaceae family, which belonged under trap crop column, was able to eradicate *O. aegyptiaca's* threat thoroughly. The most significant reduction in broomrape shoot and capsule number was demonstrated in pots which formerly contained cotton and sorghum. Furthermore, cotton decreased early infestation of the parasite, thereby significantly augmented 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 8.333% to 55.333% respectively in millet and pepper. Except for sunflower, vetch, soy bean, chick pea, sainfoin, alfalfa, zucchini, sesame, which were demonstrated to be catch crop, other cultured plants i.e. corn, oat, beet, sugar beet, triticale, caster-oil plant, Millet, fiber flax, pepper, cotton & sorghum were determined as trap crops for *O. aegyptiaca.*

Keywords
cotton, sorghum, pepper, trap crop, declining broomrape infestation, catch crop

Evaluation of herbicidal activity of metabolites of *Trichoderma* spp. for the management of parthenium weed

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The present study was designed to evaluate the herbicidal activity of metabolites of four *Trichoderma* spp. namely *T. harzianum* Rifai, *T. pseudokoningii* Rifai, *T. reesei* and *T. viride* Pers., against parthenium (*Parthenium hysterophorus* L.), one of the world's worst weed. Metabolites of the four test *Trichoderma* species were prepared using liquid malt extract and M-I-D as growth media. In laboratory bioassays, seeds of parthenium weed were exposed to original (100%) and diluted (50%) metabolites of the four *Trichoderma* spp. in 9 cm diameter Petri plates. Metabolites of all the four *Trichoderma* spp. exhibited herbicidal activity against parthenium. Metabolites of *T. harzianum* exhibited highest herbicidal activity. In general metabolites prepared in M-1-D medium were more inhibitory to germination and root/shoot growth than the metabolites prepared in malt extract medium. In foliar spray bioassays, pot grown 1-week and 2-weeks, old parthenium plants were sprayed with original *Trichoderma* metabolites thrice with five days intervals. Metabolites of all the four *Trichoderma* spp. significantly suppressed root and shoot growth in treatment where foliar spray was started on 1-week old parthenium plants. Older plants (2-weeks old) were comparatively resistant to foliar spray. Metabolites prepared in M-1-D medium exhibited more severe effect than those prepared in malt extract medium. The present study concludes that metabolites of *Trichoderma* species, especially prepared in M-1-D medium, contain herbicidal constituents which can be used for the management of parthenium weed.

Keywords
Fungal metabolites, natural herbicides, Parthenium weed, *Trichoderma*

Are biological traits behind the success of exotic plants in irrigated crops? The case of fruit tree orchards in NE of Spain

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Agriculture is an important way how to introduce plant species into regions out of their natural range. Non-native species can be successful in recipient weed communities depending on several factors like biological traits. In the plain of Lleida (NE of Spain), a high number of non-native species occurs in weed communities in fruit tree orchards. Traditional management in these crops includes summer flood irrigation and weed control by mowing. This study try to elucidate (1) if there are differences between biological attributes of exotic and native weed species in irrigated fruit tree orchards and (2) if these different attributes favor exotic species against native flora. For this purpose, weed flora in 136 irrigated fruit tree orchards was sampled. Biological traits like life form, photosynthetic pathway, kind of vegetative propagation, flowering phenology, seed traits, seed dispersal and Ellenberg index were compared between non-native and native plants. Results from the surveys show that exotic plants have higher dominance than native plants although number of exotic species is lower than native ones. Exotic species are more likely to be grasses, with C4 photosynthesis, with water seed dispersal, summer flowering and higher Ellenberg values of temperature and light. These results suggest that higher cover values of exotic weeds could be explained by their differences in biological traits regarding to native species. Traditional management of fruit tree orchards could have benefited the success of exotic weeds by selection of traits favored by flood irrigation (as C4 photosynthesis of water seed dispersal) in summer (as Ellemberg values of temperature, light and summer flowering) and mowing (as grass form).

Keywords
weeds introduction, biological attributes, Ellemberg indicator values, flood irrigation, mowing

Hordeum spontaneum: Invasive weed threatens wheat farms in Iran

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Wild barley is an herb belonging to Poaceae which is widespread throughout Iran as a weed. Rapid distribution of *Hordeum* species, especially on wheat production areas such as Fars, Khuzestan, Kermanshah and Khorasan provinces, endangered sustainable production of wheat in Iran. According to this, it is necessary to focus on the genus as a weed. The aim was investigation on ecology, distribution and transferring methods of the species for managing it. Studies showed that no herbicide can, exactly, control this weed. Therefore, no chemical methods such as using purified seeds, crop alternation and Makhar are the ways can limit distribution and developing of the species. On the other hand, investigations showed that three herbicides; Suffix, Apyrus and Total, are more useful herbicides for controlling of the weed. Studies, also, showed that the most fundamental factor in developing of distribution is farmers. A brief study, also, were done on wild barley morphology, ecology, distribution in Khuzestan, seed transferring, life cycle, and nonchemical control of this weed (prevention, crop alternation, Makhar, fire, harvesting as fodder and inflorescent cutting) along with chemical control were discussed.

Keywords
wild barley, managing methods, seed transferring, herbicide, Iran

Session 3

How far are control methods transferable between agricultural weeds and plant invaders?

Posters

Ascaulitoxin, its aglycone, and 4-aminoproline: non-protein amino acids produced by *Ascochyta caulina* as potential new herbicides

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Chenopodium album is a common world-wide weed of arable crops such as sugar beet and maize, for which the perthotrophic fungal species *Ascochyta caulina* has been proposed as a mycoherbicide. Ascaulitoxin, its aglycone and trans-4-aminoproline, a non-protein amino acid, are potent phytotoxins produced by *A. caulina.* These toxins could be used as natural herbicides. This communication will report the results of the studies carried out on their mode action, analysis of toxins in complex samples and optimization of their large-scale production, the latter aimed to their practical application.

Keywords
Ascochyta caulina, Ascaulitoxin and its aglycone, D-Trans-4-aminoproline, Mode of action, Large scale production, Analytical method

Evaluating the allelopathic potential of redroot pigweed (*Amaranthus retroflexus* L.) by ECAM method

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The laboratory-based experiments were conducted to evaluate the effects of redroot pigweed (*Amaranthus retroflexus* L.) root exudates on seedling growth of common bean *(Phaseolus vulgaris)* cultivars. The experiments were arranged in a factorial arrangement and randomized completely block design with three replications. In first experiment the factors were three common bean cultivars including Akhtar, Daneshkade and Khomein, redroot pigweed densities at 0, 4, 8, 16, 24 and 32 seeds in each beaker and redroot pigweed growing time at 3, 6, 9 and 12 days that were arranged as factorial experiment. Generally the results showed that 6 days of redroot pigweed growing time and density of 16 and 24 plants / beaker had the greatest inhibition effect on common bean root and shoot length. In second experiment the factors were included the same common bean cultivars and redroot pigweed densities with three levels of charcoal (0, 2 and 4% v/v), were added to growth medium. The effect of activated charcoal on seedling growth of common bean cultivars was significant. Addition of charcoal to the growth medium substantially decreased the inhibitory effect of redroot pigweed on common bean root growth and indicated that root exudates of redroot pigweed contain the allelopathic compounds. Also the inhibition effects of redroot pigweed on different common bean cultivars were significantly different.

Keywords
Allelopathy, common bean, growing time, redroot pigweed, root exudates

Crop residues, an effective tool for improving growth of wheat and suppression of some associated weeds

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Crop residues are well known for their allelochemicals and physical effect on crops and weeds. Allelopathic potential of different crop residues viz. sorghum (*Sorghum bicolor* [L.] Moench) and sunflower *(Helianthus annuus)* for the cannary grass, (*Phalaris minor* Retz) burclover, (*Medicago polymorpha* L.) wild oats (*Avena fatua* L.) suppression was investigated in pot study. Parts of chopped residues (shoot and root) were incorporated at 4, 8, 12 and 16 ton ha^{-1} (2, 4, 6 and 8 g kg^{-1} of the soil) into the soil and a weedy check was also maintained. Fifteen seeds of wheat, ten seeds of wild oats and cannary grass and five seeds of burclover were sown per pot. These pots were arranged in completely randomized design with three replicates. Soil incorporation of all residues substantially decreased seedling number, fresh and dry weight of tested wheat and weed species except sunflower root residue on wheat where slightly increased the above mentioned traits. Residue of both crops exhibited selectivity in their effect on tested weed species, where sorghum residue inhibited seedling numbers and dry weight of grassy weeds (canary grassy) more than sunflower. While broad-leaved weed (burclover) was greatly depressed by adding sunflower residue more than sorghum residue. These residues exerted a pronounced negative influence on the seedling number and dry weights of tested weeds (at 60 days after sowing) where sorghum shoot residues gave greatest reductions in fresh and dry weights of wild oats (43.55% and 62.90%, respectively) and cannary grass (72.00% and 73.08%, respectively) as compared to control treatments. Meanwhile, incorporation of sunflower root residues achieved highest depressions in seedling number and dry weights of burclover (90.14% and 82.76%, respectively), compared to untreated control. According to allelochemicals identified from crop residues we found that some allelochemicals were related to the crop species, where, O-coumaric (stem), m-coumaric (leaf), salicylic (leaf) and cinnamic acids were found only in sunflower (root, stem and leaf) extracts, while protocatechuic (stem) and benzoic acids were identified only in sorghum (leaf and root) extracts. Present studies conclude that integration of sorghum and sunflower residues have potential to suppress seedling growth of some weeds associated wheat. These residues can be used as eco-friendly approach for management of this weed provided that maximum levels of phytotoxins entering into the soil encounter the early growth and development of these weeds.

Keywords
Crop residue, Wheat, Weed, Allelopathy

Eco-friendly management of woody weeds in natural and urban areas: the case of *Ailanthus altissima* in the Apulian Region

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Among the arboreal and shrubby weeds colonizing non-crop environments in the Apulia Region (Italy), *Ailanthus altissima* (Mill.) Swingle (Tree of Haven), an exotic invasive fast growing species, is one of the worse. Its management is very difficult because of its fast growth and root-sucker's production, and mechanical and chemical treatments provide only short-term control. Within a research program on the management of woody weeds, impact of *A. altissima* was assessed in the wide urban area of Bari and in the Alta Murgia National Park. During numerous inspections distribution was determined by mapping all plants with GPS; their size, number and density were estimated. All damages were noted down. In Bari, data were recorded along a 76 Km path, with 146 areas of plants surveyed (most with medium-high density) and 584 single plants measured; in the Park around 126 Km of roads were mapped, with a total of 92 areas surveyed and 130 single plants measured. Compared with other arboreal and shrubby weeds, in Bari *A. altissima* proved to be the most widespread species; in the Park it is highly threatening the ecological equilibrium of the environment. Its distribution in the studied areas confirms its ability to colonize strongly disturbed, marginal, or natural undisturbed environments. Moreover, within the project, different methods for micro injection of systemic herbicides into trunks were developed and tested, to combine the effectiveness of the herbicides at reduced rates with the safety for non target organisms and environment. The results of mapping and tests will be presented.

Keywords
Ailanthus altissima, natural, urban

Biological Control of *Rumex* spp. in Europe: Biosafety studies of a native root boring sesiid moth.

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Rumex obtusifolius is widespread throughout Europe and recognized as the economically most important native weed in grassland ecosystems causing yield losses of up to 30%. It can spread rapidly due to its high seed production and ability for clonal growth, and is unpalatable to several livestock. Chemical and mechanical control measures are widely applied, but their efficiency is unsatisfactory and highly costly. The same holds for previous biological control attempts using the leaf feeding chrysomelid beetle *Gastrophysa viridula* and the leaf rust pathogen *Ramularia rubella.* In contrast, a root feeding Sesiid moth has been recently introduced from Europe into Australia, mainly against *Rumex pulcher,* which resulted in sustainable control. Following on this success, a research consortium including an industrial partner was formed in Switzerland to explore the potential of the native root borer *Pyropteron chrysidiforme* (Lep.: Sesiidae) as a biocontrol agent against *Rumex obtusifolius*. During summer 2010 we performed a series of oviposition and larval transfer test to assess its host specificity. Preliminary results indicate significant oviposition preference for the target weed. Survival of larvae transferred on 20 test plants was very low (< 1%), with only five living larvae found three months after transfer of first instar larvae, all on *Rumex* spp. Further biosafety studies include the development of procedures to increase early larval survival on the target plant, an extension of host specificity tests also to field conditions, and environmental risk assessments such as the response of potential predators to an increased occurrence of this sesiid.

Keywords
Biocontrol, weeds, *Rumex obtusifolius, Pyropteron chrysidiforme,* biosafety studies

The presence of important invasive weeds in forest nurseries

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Invasive weeds species have an incredible ability to adapt to external environmental conditions and produce an enormous amount of seeds that gives them a big expansion in space. Their presence in nurseries take away the young plants living space, overshadowed and water and nutrient shall be taken on account of growing plants. If the weed does not suppress, we will get seedlings of poor quality and in the smaller number than expected. Weed control in forest nurseries is very important because the quality seedling material is one of the main preconditions for successful rising of forest plantations. Research of weed vegetation was carried out in forest nurseries which are located in the Vojvodina. During the growing season from 2007 to 2010 year carried out an assessment of abundance and cover of weeds in nurseries by the method of Braun-Blanqet. The results showed that from the total number of registered weeds in forest nurseries, was attended by 11 invasive species. Invasive species *Ambrosia artemisifolia* L., *Erigeron canadensis* L., *Sorghum halepense* (L.) Pers., *Echinochloa crus-galli* (L.) Beauv., *Amarantus retroflexus* L. and *Portulaca oleracea* L. were present in all investigated nurseries. In addition to threatening the survival of crop plants, invasive plants seriously threaten human health. In order to prevent further spread of invasive species in nurseries have taken appropriate measures to control such as chemical and mechanical measures.

Keywords
invasive weeds, forest nurseries

The effect of some treatments on breaking seed dormancy in Mesquite

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Seed dormancy is one of the well-known features in many weed seeds caused weed control to be hard. Mesquite, as a woody perennial invasive plant has become troublesome in the arid and semi-arid regions of Iran. The effect of mechanical (sandpaper and scalpel), chemical (sulfuric acid and sodium hydroxide) and boiling water on breaking seed dormancy in two populations of Mesquite were examined. For mechanical treatments, seeds were abraded 10, 20 and 30 times with two kinds of sandpaper or scarified with scalpel. Seeds were also soaked in boiling water for 2, 5 and 10 min. For chemical treatments, the seeds were soaked for 10, 20, 30, 40, 50 and 60 min in 98% sulfuric acid or 10, 20, 30, 40 and 50 min in 50%, 70% and 90% sodium hydroxide solution. Germination was obtained through scarification with scalpel (89%, 68.2%), sulfuric acid (72.8%, 54.2%) and boiling water (53.6%, 28%), in Borazjan and Kashmar populations respectively. Sodium hydroxide (22.6%, 1%) and sandpaper (19.2%, 3.5%) have no effect on both populations, particularly in Kashmar. In general Kashmar showed more hardseedness than Borazjan populations.

Keywords
Dormancy, hardseedness, scarification, boiling water, germination

New Pathogens of *Solanum elaeagnifolium* investigated as possible biocontrol agents of the weed in Greece

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Solanum elaeagnifolium (Silverleaf nightshade) is an alien invasive weed in Greece, parts of southern Europe and many North African countries with Mediterranean climate. Since its establishment in Greece in early 1900's, it has become rapidly one the most dangerous and aggressive weeds in the country, especially in north and central parts. Climate change and the rise of temperature in the Mediterranean basin increase the possibility of spread and establishment of the weed in new regions, since it is extremely resistant to drought. Recently two new fungi were discovered attacking the weed in Greece and the goal is to evaluate the impact of their presence, and the possibility of using endemic pathogens for biological control of *S. elaeagnifolium.* The first fungus has been identified as *Verticillum dahliae.* However, *V. dahliae* is a serious pathogen and most of its strains are pathogenic to numerous hosts, so it is not appropriate as a biological control agent. On the other hand the presence of this fungus on a widespread weed is a threat to the cultivated plants, since diseased *S. elaeagnifolium* would facilitate the maintenance and proliferation of the fungus's propagules in the soils. The second fungus is *Erysiphe* spp. Chances of *Erysiphe* sp. to be specific to *S. elaeagnifolium* are very high, since most powdery mildew pathogens are host specific, but this needs further justification. This is the first world record of both fungi attacking silverleaf nightshade. The use of endemic natural enemies of the invasive, alien weeds in Europe would bring the challenge of their control to a new level.

Keywords
Solanum elaeagnifolium, Verticillum dahliae, Erysiphe sp., biological control

Heracleum sosnowskyi Manden. – possibilities of chemical control on ruderal habitats in Poland conditions

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Heracleum sosnowskyi Manden. came from the Caucasus region but it was spread across the Middle and East Europe, where it became an invasive weed species. This weed was brought to Poland at the end of 50's of past century and a several years later its cultivation as a fodder plant was begun. After short a time, the cultivation of *H. sosnowski* was finished. Unfortunately, this species started to spread spontaneously at a very fast rate. Presently, *H. sosnowski* is considered to be the most dangerous invasive weed species in Poland. In the years 2009–2010 the trials were carried out. In these experiments, the possibilities of *H. sosnowskyi* chemical control in ruderal habitats were estimated. In the trials 9 herbicides (used single and in the tank mix) were applied. The efficacy of herbicides in 2, 4, 6 and 8 weeks after treatment was evaluated. The best effect of *H. sosnowskyi* control (98% efficacy) after application of mixture flazasulfuron with glyphosate. Very good results (90–95%) were obtained at the application of herbicides containing trichlopyr and mixtures [trichlopyr + fluroxypyr + chlopyralid], [propoxykarbazone sodium + iodosulfuron methylsodium + amidosulfuron] and [trichlopyr + fluroxypyr + chlopyralid] + [propoxykarbazone sodium + iodosulfuron methylsodium + amidosulfuron]. But only first three of them prevented *H. sosnowski* from regrowing from undergroung organ. Another experiment with the use of the examined herbicides and their mixtures had a weaker effect and did not prevent the regrowing.

Keywords
Heracleum sosnowskyi, control, herbicides

Possibility of *Solidago gigantea* Aiton chemical control on fallow area in Poland

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Solidago gigantea Aiton from North America to Europe was brought. It is a invasive weed species which perfectly acclimatizes and displaces native species. Presently *S. gigantea* is very common in the whole area of Poland. It appears particularly in ruderal habitats and on fallow lands. In Poland appear above 400 000 ha fallow lands. The surface of this area is decrease each year because they are restored to agriculture production. Therefore very important problem is elimination of oppressive weed species (like *S. gigantea*) which appear in this areas. In the years 2009–2010 the trials were carried out. In this experiments possibilities of *S. gigantea* chemical control in fallow lands were estimated. In the trials 9 herbicides (used single and in the tank mix) were applied. The efficacy of herbicides in 2, 4, 6 and 8 weeks after treatment was evaluated. The best effect of *S. gigantea* control (100% efficacy) after application of trichlopyr and mixtures [trichlopyr + fluroxypyr + chlopyralid] and [flazasulfuron + glyphosate]. Very good results (90-98%) provided application of herbicides containing glyphosate and mixture [flumioxazine + glyphosate]. Another with examined herbicides and its mixtures have had a weak effect. Its efficacy oscillated in the level 15–65%.

Keywords
Solidago gigantea, fallow lands, control, herbicides

Biological control of common mistletoe (*Viscum album* L.) with hyperparasitic fungus

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Common mistletoe (*Viscum album* L.) is a perennial hemiparasitic shrub which has more, than 450 hosts. It is widely distributed through Europe and it was also introduced to North America. Mistletoes affect their hosts in many ways, they affect height and diameter growth and adversely affect the quality and quantity of wood produced and induces water stress, contributing to the forests decline spiral. Presently, there are no effective plant protection methods against common mistletoe. Direct methods, such as pruning infected branches or removing infected trees are still the only practical methods to control this hemiparasite. However, they are applicable only in small areas, such as city parks or orchards. The idea of biological control occurred when the damage on mistletoe caused by *Phaeobotryosphaeria visci* (Kalchbr.) A. J. L. Phillips & Crous was first time reported. This fungus is the most destructive pathogen of common mistletoe, which infects all plant parts, including haustoria. First we have isolated the hyperparasitic fungus and produced monospore culture for molecular identification, which was carried out by sequencing the rDNA internal transcribed spacer (ITS) region. During our pilot study we carried out successful artificial infections from pure cultures and tested various liquid media suitable for future mass fermentation. We found that the key feature for successful infection relays on the perfect sporulation of the fungus. To reach the above mentioned criteria we carried out spore induction experiments with near UV light and sugar free media.

Keywords
Viscum album, biological control, hyperparasitic fungus, mistletoe

Broomrape (*Orobanche aegyptiaca* L.) control in Sunflower (*Helianthus annuus*) with glyphosate

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Broomrapes are achlorophyllous holoparasites of many economically important dicotyledonous crops. As weeds, they cause reductions in crop yield, adversely affect crop quality, and result in loss of cultivated land due to reduced crop alternatives. Few effective control measures exist for broomrapes. One of the most promising approaches is the use of low rates of glyphosate in hosts with tolerance to the herbicide. Sunflower *(Helianthus annuus)* is a susceptible host of the root holoparasites *Orbanche aegyptiaca* in the Mediterranean region and Middle East, that suffers severe yield losses due to high levels of field infestations. Glyphosate [N-(phosphonomethyl) glycine] herbicide is selective nucleic acid metabolism and protein synthesis inhibiting that has been found effective for *Orbanche.* In field experiment conducted on 2008 to evaluate the efficacy of glyphosate in controlling the parasite weed broomrape in sunflower in Iran., *O. aegyptiaca* was controlled in sunflower-infested soils by split and root foliar applications of low rates of glyphosate herbicide. Six doses of glyphosate (0, 0.075, 0.15, 0.225, 0.350, and 0.450 kg a.i. ha^{-1}) sprayed 25 days after sunflower seed sowing and re-applied at 4-week after the first application. Orbanche infestation was severely prevented at 0.225, 0.350, and 0.450 kg a.i. ha^{-1} glyphosate application. Glyphosate significantly reduced the growth of broomrape at 0.225, 0.325 and 0.450 kg ae ha^{-1} in sunflower field. Although glyphosate treatments increased crop vigor and sunflower yield, sunflower head and kernel, was not damaged at all herbicide doses application.

Keywords
Broomrape, Sunflower, Glyphosate, Iran

Distribution, ethnobotanical uses and natural enemies of Himalayan balsam from northern Pakistan

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Himalayan balsam (*Impatiens glandulifera* Royle) is an alien invasive plant now established in more than 20 European countries, 10 states in the USA, parts of Canada and New Zealand. The native range of Himalayan balsam is spread from the highlands of Gilgit-Baltistan, Pakistan to Uttar Pradesh, India. A survey was conducted in northern Pakistan during 2007–08 to document the distribution, ethnobotany and diversity of the natural enemies in the native range. The survey areas were mainly divided into three ranges based on altitudes i.e Murree hills (6500 ft), Kaghan valley (8000 ft) and Astore & Chilam valleys (7000–10500 ft). *I. glandulifera* was found to be distributed along the seasonal streams near Kharam, Chilam valley at 10300 ft (N-35′ 07 -21.9″ E- 75.02′ -30.7″). In Kaghan valley young plants were found growing near the river Kunhar at 8300 ft (N-35′ 07 -21.9″ E- 75.02′ -30.7″) generally found growing near the moist and shady places with an association with the thicket of *Vibernum* and *Artmimisa* species. In Murree hills, the areas surveyed include Ayubia National Park, Donga galli and Chashma village (N-35′ 07 -21.9″ E- 75.02′ -30.7″). Himalayan balsam is locally used as an expectorant and for treatment of asthma and cough relief. Survey of different valleys also revealed that Himalayan balsam is voraciously fed by some herbivore insects and biotrophic pathogens. These recoded agents on Himalayan balsam could be potentially be further tested for their potential as biological control agents in introduced ranges.

Keywords
Himalayan balsam, ditribution, ethnobotany, natural enemies, Pakistan

Use of Solanaceous Plants Extracts as Alternate Herbicides for the Management of *Parthenium*

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The present study was designed to evaluate herbicidal activity of *Withania somnifera* and *Datura metel* against noxious weed parthenium (*Parthenium hysterophorus* L.). In laboratory bioassays, the effect of aqueous, methanol and n-hexane shoot and root extracts of 5, 10, 15 and 20% w/v concentrations (on fresh weight bases) of both the plant species was tested against germination and seedling growth of parthenium. In general, aqueous and methanol extracts markedly suppressed germination, and root and shoot growth of parthenium. Shoot extracts were more inhibitory than the root extracts. In foliar spray bioassay, aqueous and methanol shoot extracts of 10% w/v (on dry weight bases) concentrations were sprayed on 1-week and 2-weeks old pot grown parthenium seedlings. Two subsequent sprays were carried out after 5 and 10 days of the first spray. Both types of extracts significantly reduced length and biomass of parthenium shoots. In a soil amendment bioassay, crushed dried leaves of *W. somnifera* were incorporated in the soil at 1, 2,…5% w/w. Parthenium seeds were sown one week after residue incorporation and plants were harvested 40 days after sowing. The various soil amendment treatments of *W. somnifera* and *D. metel* reduced parthenium seed germination by 43–89% and 7-89%, respectively. Residues of 4 and 5% concentrations significantly suppressed plant biomass. The present study concludes that foliar spray of aqueous and methanol extracts, and soil amendment with leaf residue of *W. somnifera* and *D. metel* can control the germination and growth of parthenium weed.

Keywords
aqueous, methanol and n-hexane extracts, *Withania somnifera, Datura metel,* Biocontrol potential

Management of *Parthenium hysterophorus* L. by a natural herbicide – *Tagetes erectus* L.

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The present study provides an insight of use of *Tagetes erectus* as it contains herbicidal constituents for the management of *Parthenium* weed. Herbicidal effects of aqueous shoot, root, flower and soil extracts of allelopathic ornamental plant viz. *T. erectus* L. was evaluated against germination and growth of noxious alien weed *Parthenium hysterophorus* L. Aqueous extracts of 2, 4, 6, 8 and 10% (on fresh weight bases) obtained from aerial parts and rhizospheric soil of *T. erectus* inhibited germination and seedling growth of *P. hysterophorus* in bioassays conducted in petri plates. In foliar spray bioassay, aqueous extracts of aerial plant parts of 10% w/v (on dry weight bases) concentrations were sprayed on one- and two-weeks old pot grown *Parthenium* seedlings. Two subsequent sprays were carried out at 5 days intervals each. These extracts on pot plants resulted in reduced shoot and root length and biomass. In residue incorporation bioassay, crushed shoots of *T. erectus* were incorporated in the soil at 1, 2, 3 and 4% w/w bases. *Parthenium* seeds were sown one week after residue incorporation and plants were harvested 40 days after sowing. Incorporation of 1–4% residues significantly reduced germination by 25–88%. Residues at all the concentrations significantly suppressed plant biomass by 90–97%.

Keywords
aqueous shoot, root, flower and soil extracts, *Tagetes erectus, Parthenium hysterophorus*

Parthenium management by culture filtrates of *Drechslera* species

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Herbicidal activity of culture filtrates of four *Drechslera* spp. namely *D. australiensis* (Bugnicourt) Subramanian & Jain, *D. biseptata* (Saccardo & Roumeguere) Richardson & Fraser., *D. hawaiiensis* (Curtis and Cooke) Shoemaker and *D. holmii* (Luttrell) Subramanian & Jain, prepared in malt extract broth, was investigated against parthenium weed (*Parthenium hysterophorus* L.) both in laboratory bioassays and in pots. In laboratory bioassays, the effect of original (100%) and diluted (50%) culture filtrates of the four *Drechslera* spp. was studied on germination and seedling growth of parthenium in 90 mm diameter Petri plates. Original culture filtrate of all the four *Drechslera* species significantly reduced germination, shoot length, shoot fresh biomass, root length and root fresh biomass of parthe-nium seedlings by 43–77%, 77–82%, 69–82%, 90–92% and 67–83% over control as compared to control. In pot trials, foliar application of original fungal culture filtrates was carried out on 1-week and 2-week old parthenium seedlings. Culture filtrates of all the four *Drechslera* spp. except *D. holmii* markedly reduced the shoot biomass of parthenium. Two weeks old plants were more susceptible to foliar spray than the 1-week old plants. There was 13–55% and 28–65% reduction in shoot biomass of 1-week and 2-weeks old parthenium plants, respectively, due to culture filtrates of various *Drechslera* spp. The present study concludes that the metabolites of *Drechslera* spp. can be used as alternative herbicides for the management of parthenium weed.

Keywords
Drechslera spp., fungal metabolites, natural herbicides, *Parthenium hysterophorus*

Economic Benefits of an Early Eradication of Invasive Weeds in Agrosystems. The Example of *Leptochloa* spp. in Rice Fields in Spain

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The presence of invasive plants in a new area has both economic and ecological impacts. In agro-ecosystems, the estimation of the economic impact of an invasion seems more tangible than in a natural environment and it can even be an argument to establish an eradication program. However in crop fields it is not easy to have a real estimation of the economic benefits of an early eradication program. Whereas the direct costs (control strategies to be applied) are easy to calculate, the benefits are not. The benefits from eradication should be measured as the sum of yield losses caused by the weed and the cost of establishing an annual control strategy. In this work, we present an estimation of the economic benefits of an early eradication program established in rice fields in the Ebro Delta (Catalonia, Spain) for an exotic invasive weed observed in the last years (*Leptochloa* spp). Yield losses and costs of the control strategies applied were obtained from other rice cropping areas in Spain where the weed is also present and has spread during the last years. The differences between cost and benefits of eradication illustrate the importance of the early detection of an invasion and of a legal mandate aimed at eradication

Keywords
economic impact, eradication, *Leptochloa,* rice fields

Understanding leafy spurge factors of invasion in the floodplains of

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Leafy spurge (*Euphorbia esula* L. subsp. esula, Euphorbiaceae), is a well known invasive species in North America. Nevertheless, this specie is also presenting invasive characteristics in a particular ecosystem of its native area. Indeed, leafy spurge is developing in dense patches, which are numerous since 1990, in the floodplains of the Val de Saône (VDS). As this plant is producing white latex, toxic for cattle, these grasslands, which are annually mowed, are losing their profitability as soon as they are infested. This economic loss may lead to ecological issues: the abandonment of the mowing grasslands exploitation or their reconversion to intensive agriculture (corn and poplar). VDS floodplains are one of the last large flood meadow areas in Europe. Annual floods, and various agricultural practices (mowing and grazing) which they are subject, are the source of a rich floral and faunal diversity, protected under the Natura 2000 network. The project involves the pooling of multidisciplinary data for studying invasive plant/natural regulators/agricultural practices/biotic factors interactions. So, 2 investigations fields are explore:
1. understanding which are biological, genetic, ecological and agricultural factors involved in leafy spurge invasive process, and how do they interact.
2. to propose integrated invasion ways of control, targeting invasive plant/natural regulators interactions, in line with agricultural practices, after field and laboratory experimentations.

Keywords
Val de Saône, leafy spurge, invasion characteristics, natural regulators

Phytotoxicity of the genus *Inula* (Asteraceae)

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Phytotoxicity of aqueous (at 10, 20, 30 and 40 g L^{-1}) and organic (hexane, chloroform and methanol, at 3 and 6 mg mL^{-1}) extracts of Tunisian invasive plants (*Inula viscosa, I. graveolens* and *I. crithmoïdes* [Asteraceae]) and their biomass incorporated in soil (at 1.25 and 2.5 g $100g^{-1}$) was evaluated on seed germination and seedling growth of milk thistle weed (*Silybum marianum* L.). Leaf and flower aqueous extracts of the three *Inula* species, significantly, reduced germination index and seedling growth of target specie and percentage reduction varied between 73 and 100 % at 40g L^{-1}. A strong phytotoxicity was recorded with all organic fractions; especially chloroform ones at 6 mg mL^{-1}. Growth percentage reduction varied between 77–100%; 87–100% and 74–100% in presence, respectively, of hexane, chloroform and methanol leaf extracts and these values were 64–98; 75–98; 37–96% in presence of organic flower extracts. Among the three selected species, *I. graveolens* organic extracts proved to be the most effective against *S. marianum;* a total growth inhibition was recorded with all its extracts. These effects were reproducible in pots experiment, indeed thistle germination was strongly inhibited in the presence of leaves and flowers biomass of the three species of *Inula,* added to a soil. The two organs residues incorporation caused (at 2.5 g $100g^{-1}$) a reduction of 86–100% and 88–100% of, respectively, root and shoot length of milk thistle. Present results allowed concluding that *Inula* species biomass is rich in phytotoxic substances that could be the cause of their invasiveness.

Keywords
Phytotoxicity, *Inula* species, inhibition, germination, growth

Cereal breeding for organic farming: aspect of competitiveness against weeds

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Assessing weed suppression ability of crops has become more important with the development of organic plant breeding. This report introduces with first results on the project "Development, improvement and implementation of environmentally friendly and sustainable crop breeding technologies" (2009/0218/1DP/1.1.1.2.0/09/APIA/VIAA/099). The investigation is carried out with barley, oat, triticale and winter wheat varieties and breeding lines in organic crop rotations at State Priekuli Plant Breeding Institute and at State Stende Cereals Breeding Institute in Latvia. The aim is to develop the methodology for an estimation of cereal varieties and breeding lines for their competitive capacity against weeds, to establish more effective criteria of the selection by significant crop characteristics in the breeding process for organic growing conditions. Plant density after emergence, growth habit at tillering and at stem elongation, tillering capacity, plant height at the beginning and at the end of stem elongation and before the harvesting, amount of plants with inclined flag leaves at booting, beginning dates of such phenological phases as germination (emergence), tillering, stem elongation, heading and fully ripening, crop and weed ground cover several times from the end of tillering to full flowering, weed dry weights at cereal flowering, as well as crop yields are taken into account, to evaluate cereal varieties competitiveness. Harrowing is not performed in the trials, to exclude the impact of this factor. Multivariate methods are used for statistical data analysis. Detection of the most important crop characteristics, which provide the competitiveness against weeds in cereals, is stressed as a desired result.

Keywords
cereals, weed competitiveness

Session 4

Invasive aquatic weeds, difference to terrestrial weeds and invasive plants?

Oral presentations

Keynote

Aquatic plant invaders in European freshwater ecosystems: an overview

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Non-indigenous aquatic plants are a major cause of biodiversity loss in European freshwater ecosystems and can additionally cause serious economic and recreational problems. In Europe, more than 60 introduced aquatic and semi-aquatic plant species (mainly originating from North- and South America) have been recorded and show strong differences in their weed potential. In general, the consequences of mass developments of aquatic plant species are related to the growth form of the species. The large floating species (e.g. *Eichhornia crassipes*) and rooted-floating species (e.g. *Myriophyllum aquaticum, Ludwigia* spp. and *Hydrocotyle ranunculoides*) have probably the highest weed potential due to their fast growth and their ability to cover large water surfaces within a short time period. But also several submerged species (e.g. *Elodea nuttallii, Egeria densa* and the currently fast spreading *Myriophyllum heterophyllum* and *Cabomba caroliniana*) are major threats to native plant diversity, and can cause economic and recreational problems as well.
In this presentation I will give an overview about the current situation of introduced aquatic plants in Europe, their pathways of introduction, their current status of spread and highlight these species causing the most serious problems in European waters. A general Risk Assessment of the most important species will be given and Management options will be presented.

Keywords
aquatic plants, biodiversity, weed potential

Changes in aquatic macrophyte communities in large oligotrophic Lake Ala-Kitka, northeastern Finland – effects of invasive aquatic macrophyte *Elodea canadensis*

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Canadian waterweed (*Elodea canadensis,* Hydrocharitaceae) is a submerged aquatic angiosperm native to North America. This strongly invasive species was intentionally introduced to Finland, to the Botanical Garden of the University of Helsinki in 1884 (Hintikka 1917). At the present, the distribution range of *E. canadensis* covers South and Central Finland with separate plots at Lapland and Kuusamo district. First stands of *E. canadensis* were met in the northern basin of Lake Ala-Kitka, Kuusamo in the year 2008. Lake Ala-Kitka is a large (48.5 km^2) oligotrophic lake, representing moderately alkaline lakes belonging to calcareous rare botanical lake type of Potamogeton filiformis-Chara with characteristics of Carex-type. In summer 2010, we reinvestigated 33 X 9 research plots (1 m^2) of 52 macrophyte transects established in 1979–1980 in Lake Ala-Kitka. *E. canadensis* was present at 21% of the studied transects covering 1–90% of the research plots area. *E. canadensis* did not have significant effect to other macrophytes, propably due to short time (2–3 years) since invasion.

Keywords
Elodea canadensis, invasive species, impacts on species richness

Management of invasive alien species in French aquatic ecosystems: first results of a national survey

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A national survey to make an assessment on Invasive Alien Species (IAS) and their management in aquatic ecosystems in France is launched since the end of 2009. This survey is in order to answer a request from members of the French Working Group Biological Invasions in Aquatic Environments (WG BIAE). This survey is intended for managers and/or users of aquatic ecosystems. This assessment aims to take stock of IAS control and management actions. Information are collected and summarized with a view to facilitating exchanges between managers. Later, maps relating to the geographical distribution of IAS and the location of management actions in France will be produce. To reach these objectives, a questionnaire was set up in order to inventory the presence of IAS at the national scale and their visible impacts, to record management plans and the type of ecosystems colonized. The first analysis of data already collected (nearly 300 replies) illustrates the extreme diversity of situations, including management interventions. It also shows the large spread of the identified colonizations. The main detailed information extracted from these data concerns knotweed (*Fallopia* sp.) and water primrose (*Ludwigia* sp.). Black locust *(Robinia pseudoacacia)* and buddleia *(Buddleja davidii)* are also frequently mentioned. Moreover, detailed data are available on the impacts (24% of replies) and on the management of these species (18% replies). The hand pulling is the main management method used to control these plants, as well mechanical harvesting. Information on intervention costs is also summarised in this analysis.

Keywords
aquatic ecosystems, invasive alien plants, impacts, management, control methods

Importance of *Ludwigia grandiflora* as invasive weed on meadows in West France

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In flooded meadows, Large Water Primrose (*Ludwigia grandiflora* ssp. *hexapetala*) has become an invasive weed since years in many Western marshes. Settlement occurs both by cuttings and seedlings. Our purpose was (i) to assess progressive colonization in three sites and (ii) to show adaptive traits of *Ludwigia* "terrestrial forms" using another site with a strong moisture gradient, and (iii) to get recommendations for managers. (i) In the Natural Regional Park of Brière, colonization occurred through dykes. The first appearance was probably due to a dirty dredging engine. In Mazerolles polder, it was due to flooding and was increased by pumping in colonized dykes with much fragmentation. In Apigné meadow bad drainage led to colonization by *Ludwigia*. Field maps assess progressive colonization on many areas. (ii) Adaptation to land conditions led to reduced biomass of the whole plant and increased ratio between roots and stems. Cumulative stem length was only 21 cm in dry conditions, while it reached 2064 cm in aquatic forms. After settlement, plants are able to survive for years provided there is some remaining moisture in the soil. (iii) As a consequence for managers, barriers limiting dispersion of cuttings should be established in dykes but also along the hydraulic network leaving reed strips. Flooding events should lead to careful field survey to pick up the cuttings. The main problem is when fertile seeds are dispersed all over the area as in Mazerolles. No prevention exists, thus attempts of destroying *Ludwigia* mats are experimented.

Keywords
Ludwigia, wetlands, colonization, land form, management

Impact of an invasive aquatic plant: the case of Ludwigia grandiflora

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Aquatic plants have been widely introduced around the world through horticulture and the aquarium trade. Because different aquatic plants can have contrasting effects on water chemistry, habitat structure and food resources, they can have dramatic effects on many parts of aquatic ecosystems. Within the framework of the ALIEN IMPACT project we investigated the impact of *Ludwigia grandiflora,* a highly invasive aquatic weed in Belgium and other European countries, on different functional groups: native plants, invertebrates and pollinators. Up to 32 ponds were selected for the impact study on plants and invertebrates. Native plant and invertebrate richness, abundance and composition were compared between invaded and uninvaded sites in close vicinity. To study the impact on pollinators an experimental design was set up to estimate the pollinator-mediated effect of the floral abundance of *L. grandiflora* (difference in cover of the alien plant) on native potted Lythrum salicaria plants. Our results showed that *L. grandiflora* significantly reduced native plant species richness, with fewer species in heavily invaded plots. Uninvaded ponds supported a more distinct invertebrate community, including species (e.g. *Ephemeroptera*) that were rare or missing from invaded ponds. Results on pollinators showed that more insects were recorded on *L. salicaria* plants when the cover of *L. grandiflora* was low compared to the control plants (weak 'facilitation' effect). Overall, the impacts on the different functional groups were variable, but related to density of the invasive plant.

Keywords
aquatic ecosystem, biodiversity, density effect

Assessment of the management of the biological invasion of Water primrose species in France

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After their introductions in South of France in the beginning of the 19th century, two species of Water primrose (*Ludwigia grandiflora* and *L. peploides*) has been spread since about four decades on the main part of the French territory. Their large capacities of colonization of many aquatic biotopes, as river banks, shallow ponds and lakes, ditches and channels, wetlands, etc., and of competition with native species for light and nutrients, is a good explanation of their current status of invasive alien species in France. These amphibious species can grow in dense and monospecific stands up to dozens of hectares in favorable biotopes. Their impacts to native aquatic plant communities can remove numerous hydrophytes and small helophytes species in these biotopes. Dense stands in stagnant water can also create very important oxygen depletion and organic matter deposits, with a variable decrease of the water quality. Their impacts on aquatic fauna, i.e. habitat banalizing, can reduce the species diversity of macro invertebrates and fishes. Since many years, several management interventions were made, particularly in the west part of France, in lakes and ponds, channel networks in wetlands and rivers with low water currents in summer. For example, in some small ponds in the South West or in the Marais Poitevin in the west, regular interventions has been made to reduce impacts of these species. In this presentation we present ecological and biological French data and an assessment on the management of these species in France.

Keywords
water primrose, invasive alien plants, impacts, management, control methods

Cabomba caroliniana Gray in The Netherlands

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Cabomba caroliana a well known aquarium plant and traded in large volumes already for decades has recently established at some locations in The Netherlands. While quietly just surviving at some locations, it is behaving very invasive at other locations. We have characterized favourable growth conditions to predict potential distribution and studied its life-cycle to predict vulnerable stages in order to optimize control options. In addition to that, field test were carried out on the efficacy of these management techniques in close collaboration with a water board. Results will be presented on the effects of shading, regular dredging and removal of the soft sediment by new techniques.

Keywords
Cabomba, aquatic weed, management options

Relative growth rate and strategy of invasive and native Lemnid species in indoor and field experiments: is there an effect of nutrient reduction?

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Introduction of invasive macrophytes often leads to competition with native species or even with already established invasives. Several studies revealed competitive superiority of invasive plants over natives. Hence, we expect dominance of such invasives in aquatic ecosystems. Many water bodies are eutrophic, which might result in a competitive advantage of invasive macrophytes. Nutrient reduction can lead to a change in competitive performance. Competition between invasives in multiple-invaded systems is expected to be even higher, especially when they share growth form and position in the water column. Indoor experiments were conducted between two invasive free-floating Lemnid species in monocultures and mixtures under a phosphorus gradient. *Lemna minuta* is native to America, but has spread in Europe including Belgium. *Landoltia punctata* originates from Australia but was reported in The Netherlands. Since Lemnids are easily transported by waterfowl, *L. punctata* might invade Belgian waterbodies. This can result in (i) loss of established *L. minuta* (ii) exclusion of introduced *L. punctata* (iii) lower use of shared resources. Our results showed that both species performed better in monocultures but once nutrients were reduced, their RGRs were similar in mixtures. Difference in RGR (RGRD) was explained by species identity and nutrient level and indicated *Lemna minuta* as a better competitor. An additional field and an indoor experiment was performed on reduced nutrient levels for competition between two co-occurring Lemnids in Belgium: invasive *Lemna minuta* and native *Lemna minor.* The use of indoor experiments to predict field invasions and to anticipate management practices will be discussed.

Keywords
Competition, Lemnids, RGRD, macrophytes, controlled experiments

Session 4

Invasive aquatic weeds, difference to terrestrial weeds and invasive plants?

Posters

Exotic willows (*Salix* spp.) and their impact on the diversity and abundance of aquatic invertebrate communities

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The presence of willows in two freshwater streams (Sixth and Deep Creeks) in the Mount Lofty Ranges, South Australia was clearly associated with a reduction in species diversity of aquatic invertebrate communities. The introduced hydrobiid snail *(Potamopyrgus antipodarum)* was the most dominant taxon overall and was significantly more abundant under willows in both streams. Where willows were removed and not revegetated, there were lower invertebrate species numbers and diversity in both streams. The removal of willows influenced not only loss of habitat, but also increases in light intensity, decline in water quality and food availability. This situation is reversed when the riparian canopy is revegetated. Slightly more diverse fauna was recorded in the original vegetation (51 species) compared with both revegetated sites (49 species), and sites with willows removed (47 species), but was lower with willows present (39 species). The richer and more abundant fauna in the original vegetation and revegetation sites is due to a sparse, open canopy which permits higher primary productivity and favours more diverse growth of aquatic plants, shrubs and grasses. Our findings conclude that the presence of willows reduces species diversity and abundance. Removal of willows without subsequent revegetation resulted in lower species numbers and diversity of the aquatic invertebrates. We suggest that large scale willows removal may need special management considerations in order to reduce the impact on aquatic invertebrate communities.

Keywords
aquatic invertebrate communities, willows, diversity, abundance, revegetation

Ecological Study for Invasive *Potamogeton* species in Tigris River Stretch Within Nineveh Province-Iraq

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After completion of Mosul Dam construction on Tigris River and Lake formation in (1985) different genera of hydrophytes were invade the river. Variations in time and space for water quality, distribution and abundance of *Potamogeton* species were considered in 75 km long stretch below Mosul dam. Water temperature reached low values around 11 °C in February and increased to values more than 23 °C in August . Electrical conductivity ranged between 338 and 900 µs/cm. Values above 600 µs/cm were recorded only in August and September (i.e.) the period of highest evaporation rate. pH values ranged between 7.6–8.9. The monthly variations were inversely related with water temperature. Nitrite level ranged from 0.05 to 29.3 µg at NO2-N/l. The Monthly variations characterized by the presence of two peaks that coincident with rainfall and high discharge of the River. Nitrate range were wide. The values restricted between 480–2090 µg at NO3-N/l. The low values were recorded in July and August due to consumption by blooming species. Phosphate was one of the main factors behind the heavy growth of *Potamogeton* species since concentrations, throughout the studied period, were more than the critical value. *Potamogeton* species showed variability in their distribution and abundance. *P. perfoliatus* as an example, was found in one location only while *P. nodosus* was occurred in all locations. Most *Potamogeton* species were bloomed in summer and autumn and almost disappeared in the rest seasons.

Keywords
Iraq, Nineveh, Tigris River, Water properties, Plant nutrient, *Potamogeton* species

Distribution pattern of *Campylopus introflexus* in peatlands of Lithuania

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Campylopus introflexus (Hedw.) Brid. is the only invasive bryophyte species recorded in Lithuania (first record in 1996). Targeted investigations on distribution pattern of the species in peatlands were carried out in 2010. About 20 recently or formerly managed peatlands were studied throughout the country. Sampling plots (5–10) were selected in each of the study site. The abundance of vascular plant and bryophyte species was evaluated following Braun-Blanquet scale. Percentage cover of all vascular plant and bryophyte species was recorded in 20 small plots (0,5×0,5 m). Phytomass of *Campylopus introflexus,* other bryophytes and vascular plants was estimated in 3 small plots. The invasive moss was ascertained to be the most frequent species (83 % of all small sample plots) in the initial stages of vegetation succession in the areas with disturbed natural vegetation. *Polytrichum strictum* Sm. was also frequently presented bryophyte species (78% of all small sample plots). Vascular plants (in total 114 species) of various ecological and biological groups were registered in the study plots. The most frequent were *Betula pendula* Toth, *Calamagrostis epigejos* (L.) Roth, *Calluna vulgaris* (L.) Hull., *Eriophorum angustifolium* Honck, *Phragmites australis* (Cav.) Trin ex Steud., *Pilosella cymosa* aggr. In most cases *Campylopus introflexus* exceeded all vascular plant and other bryophyte species by abundance (mean cover 34 %) and phytomass. The research was funded by a grant (No. LEK 22/2010) from the Research Council of Lithuania.

Keywords
Campylopus introflexus, Lithuania, peatlands, bryophytes

Mapping and Monitoring of an Aquatic Invasive Plant *(Ludwigia grandiflora)* with Multispectral Remote Sensing in a large wetland in West of France

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Concerning the colonization by *Ludwigia grandiflora* in Western France, managers need risk maps. This study presents spatial, spectral and temporal remote sensing assessments in order to use multispectral approach for monitoring colonization of lakes and streams within a large wetland (<1000 km²). Different classification methods – maximum likelihood, minimum distance, spectral angle mapper – and subpixel processing – linear spectral unmixing, Fcov (fraction of vegetation cover) / NDVI (Normalized Difference Vegetation Index) – were conducted within the drainage area on SPOT 5 images acquired in 2003, 2005, 2008, 2009 and 2010. The maximum likelihood classification method provided better results – kappa coefficient: 0.96 for 2010 – while the minimum distance methods and spectral angle mapper gave kappa respectively: 0.72 and 0.92. This method, although requiring a lot of field verifications, provides a relatively fine mapping of macrophyte stands (some m²) interannual and monitoring of the colonization of *Ludwigia.* The two independent methods of analysis have provided maps subpixel abundance of aquatic vegetation similar and consistent with expert knowledge in that field. The identification of this vegetation is ensured when the coverage rate is high. This study shows that mapping *Ludwigia* across a large wetland is possible but has some limitations due to spatial and spectral properties of SPOT 5. The mapping of abundant aquatic vegetation is also possible and could be coupled with other biophysical variables – biomass, LAI – and water – connectivity of lakes and streams – in order to obtain a map of risk.

Keywords
Ludwigia grandiflora, multispectral remote sensing, risk map, monitoring, classification

Aster and Sunflowers species – threat to the riparian habitats

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Adaptive strategy of invasive alien species, provide them possibility to easily and quickly spread in the different type of habitat – ruderal, anthropogenic disturbed habitat, but also on the undisturbed native habitat. Natural ecosystems are nowadays presented in the Pannonian Plain only fragmentary. Riparian habitats are one of the main native types of habitats in this area, preserved around long lowland rivers. Species, introduced as horticultural or agricultural, mainly are not investigated as possible threat for the native habitats. But, it is not rare, to some of these species "escape" and start forming stabile populations in nature. Family Asteraceae have the biggest number of the species in Europe. Taxonomical analysis of alien plant taxa gives the same result. *Aster* and *Helianthus* species are known in Europe for the centuries. Mostly they grow in the mono-dominant, dense populations along rivers and river flows, and change the floristic structure of native associations. Spreading of them, directly are endangered rare and vulnerable species, which today have small, fragmented areal in native riparian habitats. The structure of the newly created communities often prevents the rehabilitation of natural associations'. Early detection and investigation of non-native species, with high adaptive potential are the base for the adequate protection and conservation of native ecosystems, and species and native hybrids of the aster and sunflowers require this attention.

Keywords
Aster, Helianthus, riparian habitats

Session 5

The example ambrosia: management options and integration across target habitats

Oral presentations

Keynote

Can Europe successfully fight the ragweed invasion?

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The North American annual Ragweed (*Ambrosia artemisiifolia,* Asteraceae) was introduced unintentionally to several regions of the world where it has established and spread as a non-native species. In Europe this spread started in the 19th century and is still ongoing. Due to its impacts on agriculture and human health, the plant is perceived as an undesirable addition to the countries where it occurs. Many countries have consequently set up measures to prevent further introduction and spread, and to reduce existing populations. These include funding of research, creating legal instruments, public awareness campaigns, and monitoring programs. More recently, international European efforts with the same aim were launched. The EU commission is currently funding two research projects aiming at a better knowledge of the species' distribution and impacts and at testing and promoting control measures for efficient reduction of the species' abundance.
It does not appear that the spread of ragweed in Europe has been stopped or even slowed down significantly with the exception of some local or regional successes. We review the biological basis of the successful invasive spread of ragweed, the knowledge of mechanical, chemical and biological control measures, and the features of successful and non-successful national efforts. The role of Common Ragweed as model for an invasive plant in the awareness of the general public and the strength of respective activities by policy makers will be discussed.

Keywords
Invasion, ambrosia, Europe

European initiative for sustainable management of *Ambrosia artemisiifolia*

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Common ragweed, *Ambrosia artemisiifolia,* has uniquely raised the awareness of invasive plants in Europe. The main concern is its particularly large production of highly allergenic pollen that causes allergic rhinitis and severe asthma in over 20% of the population of affected areas. Furthermore, ragweed is presently the worst weed of major crops in several countries in Eastern Europe. Its range is still expanding in Europe and is likely to accelerate under a changing climate, increasing its threat in countries not affected yet. We plan to initiate a long-term platform to network, strengthen and disseminate research towards an economic and sustainable management solution of this exotic plant invader in Europe. Specific directions are the development of innovative long-term management options such as biological control and vegetation management and their integration with available chemical and mechanical control techniques to provide site- and country-specific control options. The present status of this collaborative research initiative and its links to other recently launched European *Ambrosia* programmes will be presented.

Keywords
biological control, *Ambrosia*

Common ragweed pollen counts (Cour's method), temperatures, rains, relative humidity: evolution 1982–2010 in Lyon (France)

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The pollen trap of the « Association Française d'Etude Des Ambroisies » (AFEDA) is settled down, since 1982, in the Lyon-Bron meteorological centre in an area particularly invaded by this noxious weed. Till nowadays, it remains in the same place, during 29 years. The pollen rain is registered each week and meteorological parameters are registered in the same time. In the first years, the *Ambrosia* pollen concentrations were important and increased year by year till 1994 and 1995, but since 1996 they began to decrease. These data are compared with meteorological criteria, temperatures, rain amount and relative humidity Temperatures were considered during the whole year. Annual temperatures increase from 1982 to 2010 but this increase is less important from 1996 to 2010. The main increase (1982–2010) appears to be during March to May, i.e. during the growth beginning of the plant. The increase during the ragweed flowering period is less important. The increase during weeks 42–52, year n-1+weeks 1–13, year n (period of seed and of dormancy) is weak. As far as rain is concerned the rate averages nearly do not change during weeks 28–40, 1982–2010, only the relative humidity is decreasing. The reasons of the common ragweed pollen concentrations decreasing will be discussed.

Keywords
Ambrosia, climate parameters, Lyon, France

Population structure and migration routes of the invasive Common ragweed in eastern Central Europe deduced from microsatellite markers

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Common ragweed (*Ambrosia artemisiifolia,* Asteraceae) is a serious risk for human health due to its highly allergenous pollen and an important agricultural weed. The plant was introduced from Northern America into Europe in the late 19th century. Until the early 1990ies common ragweed was a rather rare inhabitant of disturbed anthropogenous habitats. In the recent years its abundance strongly increased. The invasion of common ragweed started into Western and Eastern Europe, and is assumed to consist on the one hand of expansions of long-established populations and associated migration events and on the other hand of recent introductions from contaminated bird food and agricultural seed. In this study a dense sample with 79 populations from Austria and with three samples from Italy, one from Germany, six from Hungary, two from Russia, four from Slovenia, one from Serbia, one from the Ukraine and one from China, as well as two from bird seeds has been included for genotype analyses based on six microsatellite regions. The aims of our study are (1) to investigate the mode and directionality of colonization of common ragweed into Austria and eastern Central Europe in general, (2) to infer the genetic structure of the populations in the studied region, and (3) to identify potential genetic differences between populations from different habitat types. Analyses will be conducted to infer deviations from the Hardy-Weinberg equilibrium, general genetic structure of the populations, genetic diversity patterns, possible bottleneck events and genetic clustering of the studied individuals.

Keywords
Ambrosia, microsatellites, population genetics, migration routes

Competitive suppression of common ragweed in early successional stages of revegetation

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The annual invasive *Ambrosia artemisiifolia* L. (Common Ragweed) causes health problems and crop yield losses. Persistent soil seed bank and high seed production rates make the control of this neophyte especially difficult. The approach chosen to solve this problem is to devise an efficient measure preventing further massive seed production. Chemical control cannot be applied in this context, be it for resistance problems, for legislative reasons or out of environmental concern. Non-chemical management solutions need to be developed. Ragweed is a shading-intolerant plant. In a pot experiment we test the efficiency of sawn vegetation under high and low ragweed density. Two commercial seed mixtures differing in their respective quantities of competitive grasses and clover are selected to compete with ragweed. We measured the development of ragweed population size and biometric variables before each cutting event and once after the last cutting. We found lower germination rates for the ragweed plants growing in Mixture 2 (higher proportions of Perennial Ryegrass) than in the Mixture 1 (0.2 and 0.4, respectively). Between the two terms we found 65% (Mixture 1) and 64% (Mixture 2) ragweed-mortality. This negative trend slowed down after the second term but continued until the end of the experiment. In glasshouse conditions the use of simultaneously sown competing vegetation showed to be very effective in reducing ragweed density and therefore prevent high seed production. Experiments with sowing of competing vegetation on newly constructed roadsides in field conditions are currently running.

Keywords
Ragweed, management, invasive, neophyte, competition, roadside vegetation

The "Berlin Action Programme against *Ambrosia*"

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During the hot summers of 2003 and 2006 the two Berlin pollen traps of the Institute of Meteorology (Free University Berlin) detected the first very high exposure (60 pollen grains per m**3 air) of *Ambrosia* pollen. In early 2009 interested groups and individuals in Berlin founded the „Berlin Action Programme against *Ambrosia*" (www.fu-berlin.de/ambrosia). The aim of the information and action network is to prevent the spread of *Ambrosia* in Berlin and to minimize the occurrence. Information from, and participation of the general public, systematic surveys and mapping, the systematic removal and monitoring of habitats and the expansion of the network are the key objectives. "Ambrosia Scouts" have been searching 9 out of 12 districts of Berlin systematically, eliminating *Ambrosia* plants and mapping sightings in the public internet based „Ambrosia Atlas". An important conclusion of the "Action Programme" is that annual *Ambrosia artemisiifolia* occurs mainly in the western part of Berlin and is usually spread through bird food. In the eastern part, one finds mainly the perennial *Ambrosia psilostachya,* which is spread by earth moving during construction activities. 90% of the 1281 populations documented in 2010 were classified as *Ambrosia artemisiifolia* (some 65,000 plants). Only 10% were *Ambrosia psilostachya* but set against the vast number of 1.5 million plants. 95% of the *Ambrosia artemisiifolia* populations could be eliminated, but only 45% of the perennial *Ambrosia.* Therefore, *Ambrosia artemisiifolia* habitats can be combated effectively by „Ambrosia Scouts" and the general public. The vast expansion of *Ambrosia psilostachya* is Berlin's greatest problem.

Keywords
Ambrosia, "Action Programme", Ambrosia allergy, *Ambrosia psilostachya,* health

Optimization of cutting regimes for control of ragweed along roadsides

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Ambrosia artemisiifolia L. (common ragweed) is an annual neophyte in Europe. This Asteraceae has been introduced from North America and causes health problems and crop yield losses also in its introduced range. Persistent soil seed bank and high seed production rates make the control of Ragweed especially difficult. The main approach to solve this problem is preventing massive seed production. Like many European countries, Austria faces the problem of linear spread of ragweed along roadsides. Management regimes of the roadside vegetation can have high influence on the production and spreading of ragweed seeds. Two parallel experiments have been started in order to detect the influence of different timings and frequencies of mowing on several growth and reproductive traits of ragweed: one experiment where 8 different cutting regimes were applied to individual plants (pot experiment), and a second experiment where 4 different cutting regimes were applied to ragweed plants sown with roadside vegetation mixtures (box experiment). The cutting regime had serious influence on both morphological and reproductive traits in all trials. The results show that the commonly applied control strategy of mowing of roadsides (especially its timing and frequency) should be designed in a more sophisticated way. I.e. they should be based more on target plant traits such as resprouting ability or phenological development and less on calendar date as often done in praxis by road services. Basal resprouts generally tended to develop mostly female flowers which produce serious numbers of seeds that will cause effective persistence of established roadside populations.

Keywords
ragweed, mowing, management, roadsides, invasive plant, nepohyte

Session 5

The example ambrosia: management options and integration across target habitats

Posters

Concentrations of airborne pollen of ragweed (*Ambrosia artemisiifolia* L.) in Lithuania

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Understanding of biological invasions requires interdisciplinary studies. Major part of studies is performed by population and community ecologists and receiving little attention from aerobiologists. *Ambrosia artemisiifolia* L. pollen may produce major hay fever symptoms during its pollination period in August and September. The sensitization rate of subjects allergic to ragweed pollen in the European population is quite high and still increasing. In Lithuania *Ambrosia* plants are hardly found, but the amount of the pollen in the air is constant. In the three places of Lithuania ragweed pollens were sampled from 2006 to 2010 by a Hirst volumetric trap calibrated to handle a flow of 10 L/min of air, which roughly corresponds to a human breathing rhythm. Pollen counts were performed on a daily and bihourly basis, which is of particular importance in allergologic practice. Concentration of ragweed pollen varies from year to year and depends on location of aerobiological station. Largest index of *Ambrosia* pollen is usually recorded in continental part of the country. In some days concentration of ragweed pollen exceeded 30 pollen grains/m^3 and sometimes reached 65 pollen grains/m^3. Our results show that the number of days with values exceeding a daily average of 30 pollen grains/m^3 air is very rare. Diurnal variation in pollen concentration showed a peak of pollen during the first part of the day. This research was funded by a grant (No. LEK-15/2010 AMBROZIJA) from the Research Council of Lithuania.

Keywords
Ambrosia, pollen, Lithuania

Effect of plant growth promoting rhizobacteria on *Iva xanthifolia* and *Ambrosia artemisiifolia* seed germination

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Soil bacteria are able either to stimulate or inhibit seed germination by way of various bacterial products (auxine, gibberelin). Such activity is either indirect, with bacteria producing substances that prevent the activity of pathogenic microorganisms, or by making important nutrients available to plants. This investigation focused on testing the germination of *Iva xanthifolia* and *Ambrosia artemisiifolia* on media with growth promoting rhizobacteria. Germination of *I. xanthifolia* was studied under media: mixed population of *Azotobacter chroococcum, Bacillus megaterium* and *B.circulans* (A1), humates (humic and fulvic acids extracted from peat) (A2), a mix of humates and *A. chroococcum* (A3), *A. chroococcum* (A4) and *B. cirkulans* (A5). Germination of *A. artemisiifolia* was studied under media: *Pseudomonas fluorescens* (B1), *A. chroococcum* (B2), *B. licheniformis* (B3), *B. pumilus* (B4), *B. amyloliquefaciens* (B5). In control, seed germinate in water. Germination of *I. xanthifolia* was higher in all treatments than in control, while germination was the best in A3. All treatments had stimulating effect on germination, but it was not found that A5 treatment has a prominently high effect on seed germination of this species. Germination of *A. artemisiifolia* varied depending of bacterial media. The highest germination rate was found for B4 and the lowest for B1. Treatments B1 and B3 had inhibitory effect on germination, tretments B2 and B4 stimulated germination, while germination in treatment B5 was the same as in control. The seedlings of weeds emerge more uniformly when seed germination is stimulated, so that they could be killed in the next step of weed control.

Keywords
Iva xanthifolia, Ambrosia artemisiifolia, PGPR

Five Years of Experience with an Action Plan for *Ambrosia* Control in Eastern Switzerland

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Ambrosia artemisiifolia L. is a quarantine organism in Switzerland. All plants have therefore to be removed by the landowner and the sites have to be registered. To find infested sites, municipality employees, gardeners and farmers have been instructed in short courses. They watched out for ragweed "by the way", when working outdoor. Specific controls were only made on critical sites (e.g. sunflower fields, gravel pits, old construction areas, fallows). Small and medium populations were easily to control by pulling up. Big populations in arable land need more patience. The strategy is to prevent the ripening of new ragweed seeds. The farmer has to respect a decreed crop rotation : Forbidden are crops, which allow ragweed ripening e.g. sunflower, soybeans. Recommended are cereals, rape seed or salads followed by plowing before 1. of September. Maize is allowed with potent herbicides only. Infested sunflower fields or maize fields on organic farms have been destroyed or harvested prematurely to prevent ragweed from spreading into new fields by harvesting equipment. In the canton of Zürich the number of registered populations decreased from almost 600 to around 40. In strongly infested arable land the number of emerging seedlings in 2009 was 95% lower compared to 2006. The costs of the measures taken have been significantly lower than expected at the beginning.

Keywords
Ambrosia, Integrated Control, Action Plan

Immigration history, distribution and naturalisation of *Ambrosia artemisiifolia* in Lithuania

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Ambrosia artemisiifolia is a noxious alien weed in southern regions of Europe and Asia. In Lithuania two species of *Ambrosia genus* were registered, i.e. *A. artemisiifolia* and *A. trifida. A. trifida* is a rare casual grain immigrant and its naturalization is hardly possible. *A. artemisiifolia* is constantly recorded in Lithuania and in certain years it reproduces by seed, though self-sustaining permanent populations in the country are still not known. Nevertheless, temporarily occurring *A. artemisiifolia* in Lithuania successfully flower and can be a source of airborne pollen. Distribution of *A. artemisiifolia* in Lithuania is evaluated basing on herbarium specimens deposited in the herbaria, publications, unpublished authors data and field investigations. All findings of *A. artemisiifolia* in certain locality in the same year were treated as one record. The most intense immigration of *A. artemisiifolia* in Lithuania took place since 1980s. In the period of 1981–1990 this species was recorded 88 times. During the next decade (1991–2000) the number of records decreased to 45. From 2001 to 2010 it was found 8 times. The analysis of the data on *A. artemisiifolia* distribution in certain periods shows that, the number of it records in Lithuania during the last decade significantly decreased because of a) the decrease of grain import to Lithuania, as imported grain is the main source of its seeds; b) strict management of railways, railway stations, grain mills and their surroundings. Naturalisation of *A. artemisiifolia* in Lithuania is possible, therefore measures to prevent this process should be employed. This research was funded by a grant (No. LEK-15/2010 AMBROZIJA) from the Research Council of Lithuania.

Keywords
Ambrosia, immigration, distribution, Lithuania

Microsatellite variability of *Ambrosia artemisiifolia* L. in populations of Serbia and Croatia

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In Europe, *Ambrosia artemisiifolia L.* (Asteraceae) has been described as one of the most aggressive invasive plant species. The increasing problem of human sensitization to ragweed pollen and its high densities and harmful effects in crops fields, indicated the necessity of analyzing all aspects of this plant. In our study we analyzed microsatellite variability in two Serbian (Šabac, Kruševac) and two Croatian (Lug, Ilača) populations of *Ambrosia artemisiifolia.* Fresh leaf samples of 119 individuals from 4 wild populations of A. artemisiifolia were collected, a set of three microsatellite loci: Amb12, Amb16 and Amb30 were amplified and allelic variability was screened by 6% denaturing PAA electrophoresis. At locus Amb30 the highest number of alleles (13) was detected, while at loci Amb12 and Amb16 lower number of alleles were found (3 and 10 alleles, respectively). Using Hardy-Weinberg exact test for all population and all loci, we detected deviation from Hardy-Weinberg equilibrium (Ho=0.407, He=0.615), although at locus Amb12 there no heterozygote deficiency was detected. Intraclass estimate showed that populations from Šabac and Kruševac are genetically the most identical (FST=0.0187) and that populations from Šabac and Lug have the highest genetic divergence (FST=0.1133).

Keywords
Ambrosia, allelic variability, microsatellites

Ragweed: pollen trap, a tool to define the pollen grains origin

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To provide information and forecasts for population and doctors about the allergy risk due to pollen for prevention, R.N.S.A (Aerobiological Monitoring National Network, a French association) organized a pollen traps network in the main cities of France. The health impact of air content in ragweed pollen depends mainly on population exposure and the local origin of seedlings. The pollination of ragweed takes place during the morning within the increase of the temperature.

To measure the exposition of people by pollen grains, the analyses of the registration are made with light microscopy with a bihourly time step, after pollen grain impaction within pollen trap. The study of the circadian rhythm of grain impaction allows to know if the production of pollens is from the same area than the trap (at few kilometers), for instance with morning peak, or at distance (until few hundreds kilometers) if the peaks are in the afternoon or even on evening or night. The meteorological information permit to complete these data.

It is possible to compare the maps showing the allergy risk (pollen exposition, and health impact) and the localisation of the plants with the study of the circadian rhythm. This method, using bihourly pollen counts, is complementary with the local observation which needs many observers with a good formation. This study allowed us to get a map showing the localisation of the ragweed plants of the French territory for years 2006 to 2010, using bihourly counts and the circadian rhythm for different locations.

Keywords
ragweed, pollen, origin, circadian rythm, bihourly counts

How does common ragweed tolerate insect herbivory?

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The North American invasive common ragweed, *Ambrosia artemisiifolia* L., was studied to explore the effect of leaf herbivory on plant reproductive and growth capacities. Plants were defoliated by hand in early summer, simulating different degrees of insect grazing with removing 0%, 50% or 90% of each leaf-limb, one month after transplantation. Six different populations, 3 from the North American native range and 3 from the French invaded range were tested. Root dry weight, shoot dry weight, plant height were measured at the end of the growing season. Root biomass decreased significantly by 36% for North American native populations and by 28% for French invasive populations with a higher level of defoliation. Shoot biomass was not significantly different following defoliation either for native or for invasive populations. North American native populations had lower shoot and root biomass, but higher shoot:root ratio following defoliation. French invasive populations had a higher stem, higher total biomass, higher number of female flowers and a higher seed production. These findings suggest an efficient reallocation of plant resources in the shoots at the expense of roots following defoliation, which allows *Ambrosia artemisiifolia* to tolerate herbivory. The results of better reproductive capacity for common ragweed populations in the French introduction area support the concept of increased vigour of invasive species and revealed that French invasive populations are able to better compensate for leaf damage than North American native populations.

Keywords
Ambrosia artemisiifolia, tolerance, artificial defoliation, native vs. invasive

Studies on the relevance of common ragweed *(Ambrosia artemisiifolia)* in seed, birdseed and compost

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Common ragweed (*Ambrosia artemisiifolia* L.) is currently spreading in Austria, particularly in the last decade on arable and non arable land. On the occasion of an increasing incidence of common ragweed in Austria a research project was started. Aims of the AGES work package in the area of agriculture were to appraise the relevance of seed, birdseed and compost. AGES as the national authority for seed certification including field inspection, laboratory tests and enforcement control of marketed seed lots as well as for feed. That gives possibility to detect ragweed seeds in different samples officially tested evaluating the risk of a spread of ragweed caused by certified agricultural seed and birdfeed. Results show that the risk of a spread is low in officially tested and marketed agricultural seed. To estimate the influence of feed for wild birds, samples of marketed lots in Austria have been analyzed by AGES too. Results show that 30 % of marketed bird feed for wild birds contains ragweed seeds. Common ragweed´s spread is caused by by several human activities. For example organic waste could contain in some particular cases plants with ragweed seed. Composting of organic waste as one possible channel of distribution was investigated. Possibly destroyed seeds or not in the process of composting could be distributed by application of compost e.g. in organic farming or by fertilizing the production areas of arable land. In this case ragweed- free land is getting contaminated with germinable ragweed- seed. The efficiency of sanitizing organic waste in the process of composting was evaluated with bags containing germinable ragweed seeds in professional composting plants in practice.

Keywords
Ambrosia, ragweed, seed, birdseed, compost

Several years lasting experience in ragweed control in urban settlements on the example of the City of Novi Sad

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Seven years lasting field studies of *Ambrosia artemisiifolia* L. distribution and mapping on the territory of the city of Novi Sad were performed on regulated, unregulated urban green areas and on arable land. For mapping of ragweed distribution, partially modified method of Braun-Blanquet was used, and data processing was performed by specially designed program Ambrosia Spot Marker. Monitoring, i.e. abundance and coverage of ragweed after mowing was carried out 2 and 4 weeks after control in order to establish retrovegetation. During vegetation period, this allergenic species was controlled by multiple mowing, and ruderal sites outside settlements were treated by glyphosate at a rate of 1.2–2.4 kg ha^{-1}. The study comprehended also monitoring of pollen concentrations in the air by a Rotorod pollen sampler spore collector. Recommended mechanical measures such as mowing, drilling in the phase of germination, and chemical control measures, led to significant reduction of *A. artemisiifolia* L. in all studied locations. In the second half of August 2009 the highest number of pollen grains was 783 per m^3 of air, while in the same period of 2010 it was 500 pollen grains per m^3. In 2008 data analysis of diseased infants that had allergic rhinitis revealed only a small number of young patients (383), while their number at the end of 2009 was 393. In the third quarter of 2008 the highest difference in number of infected infants, numbering 32 of them (0.16%) and in 2009 their number increased to 102 (0.50 %).

Keywords
Ambrosia artemisiifolia, control, Novi Sad, number of pollen grains, allergic rhinitis

Population Genetic analysis of Common ragweed (*Ambrosia artemisiifolia* L.) in Europe using DNA – Based Molecular Markers

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Ambrosia artemisiifolia L., commonly known as Common Ragweed by weed biologists is invasive in Europe, causing important economic and public health damage. The European and North American populations are at high risk of developing allergic reactions due to the pollen from *A. artemisiifolia.* The present study aims at understanding the genetic diversity/ variability among a population of *A. artemisiifolia* consisting of 90 genotypes sampled across Hungary and other European countries such as Romania, Serbia, Austria, Germany and France. Genetic diversity is an important component of plant adaptability as it describes the ability of weeds to establish and proliferate in areas and environments which are not native to them. Further genetic diversity can be used to investigate the history of the population as well as its invasion routes into a new environment and may also be useful in predicting the likelihood of its survival and spread. More over this study would lay a platform for future studies pertaining to *A. artemisiifolia* such as Phylogenetic analysis where other species of *Ambrosia* would be compared with it using molecular DNA based techniques. Thus for comparing the genetic diversity within the population, a DNA based molecular marker technique called Start Codon Targeted (SCoT) primer was used. SCoT is based on the short conserved region in plant genes surrounding the ATG translation start codon. SCoT is a new technique and has not yet been applied for genetic diversity studies in weeds. Hence 11 different SCoT primers were used to fingerprint the sample population. The banding patterns are evaluated and a dendrogram showing the relationship of the population is constructed.

Keywords
Ambrosia artemisiifolia, Population Genetic analysis, SCOT-Start Codon Targeted polymorphism, DNA-Based Molecular Markers

Common Ragweed *(Ambrosia artemisiifolia)* in Ticino: development and approaches

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Since 2003 *Ambrosia artemisiifolia* is considered in Ticino as a problematic plant, because of its allergenic pollen and its high potential of reproduction. The cantonal authorities decided in 2004 to set up a working group ("Gruppo di Lavoro Ambrosia") aimed to study this invasive plant and to coordinate the strategies for slowing down its spread in the region. Since 2006 *A. artemisiifolia* is officially part of the quarantine organisms in Switzerland and since 2007 there are cantonal directives to cope this weed. The main purpose of these efforts is to avoid inflorescences to prevent pollen and seed dispersal. In the last 7 years many strategies have been adopted. First of all, private and public institutions have been sensitized and informed. Second, a mapping and monitoring of old outbreaks, as well as the new ones and the potential ones have been realized. Finally, *A. artemisiifolia* has been fought by grubbing, frequent cuts or herbicides, depending on the location and the density of plants. During the years the geographical presence of *A. artemisiifolia* increased in Ticino. There was a general increase of outbreaks, but for each location the trend is a decreasing plant density with time. The past activities showed some positive results. However, the natural and anthropogenic spread of *A. artemisiifolia* seems not to be slowed down. In the future there should be a better control of soil movements in Ticino, in order to avoid further seed dispersal.

Keywords
Ambrosia, Common Ragweed, Ticino, development, approaches

Analyzing the content of the main allergen (Amb a1) of ragweed pollen in the air of Poznań (Poland) in 2010

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Distribution of ragweed (*Ambrosia* spp.) in Poland is limited mainly to southeastern part of the country and the last documented finding of ragweed population in Poznań (western Poland) was reported almost 20 years ago. However every year during August and September certain number of *Ambrosia* pollen is recorded in the air. It has been showed that most of the ragweed pollen arrived at Poznan from a southerly direction (mainly Czech Republic, Slovakia and Hungary). Second important source of ragweed pollen is located in eastern Poland and Ukraine. It is still not clear how environmental conditions during long distance transport influence on pollen grains, especially theirs allergenicity. Therefore it was decided to measure and compare pollen and allergen concentrations in the air arrived from distant sources. During 2010 simultaneously with pollen grains monitoring the detection of the main allergen of ragweed pollen *(Amb a1)* was performed. Pollen were sampled by volumetric spore trap (Lanzoni) and allergens using high-volume cascade impactor (Chemvol). Two fractions of airborne particles were analyzed: >10µm and 10µm–2,5µm. Detection of allergens were performed using immunoenzymatic test (ELISA).

Keywords
Ambrosia pollen, LTD, Amb a1

A new control method for fighting common ragweed: the dust flux method

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Municipalities need a control system for assessing the effectiveness of the fight against common ragweed. Saint-Priest' decision-makers (Rhône, France) wanted to measure their action assessment in different parts of the territory and later, the evolution of this action, the commune being too large for identifying weeds in situ. The dust flux method was developed in 1973 and then used in many countries. The aim of the study is to compare, on 3 different kinds of dirt tracks, the percentages of the main pollen types with the percentages of those of the close atmospheric trap (atmospheric pollen), during the ragweed season and during the week of the dust flux. Our references are the seasonal A pollen counts and pollen counts of the week 38. The nearby atmospheric trap used by AFEDA (Cour's method) has been running for 29 years at less than 5 kilometres of the samplings sites. We present the first year of study. On the 22nd of September 2010, dust flux samplings have been conducted on a technical area (near a rural area), a rural area and a town centre area. Results show the proximity of the ragweed pollen percentages of rural areas with those of the trap (total pollen and week 38) and the differences for Gramineae, *Plantago* and arboreal pollens (except Cedar) whose seasons are finished. Lower ragweed percentages are identified in the town far from the rural areas. These dust flux samplings will be go on some years. Data of other interested communes will be compared.

Keywords
dust flux method, new control method, fighting ragweed, *Ambrosia* pollen, Cour's trap

Common Ragweed *(Ambrosia artemisiifolia)* invasion in Switzerland: dispersal rather than multiple random introductions

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The invasive plant species Common Ragweed (*Ambrosia artemisiifolia* L., 1753) has spread in Switzerland over the last decades. Serious health illness (hight fever, asthma) are induced by its pollen and ca. 12% of citizens are subject to ragweed allergy. In heavily infested area in Europe, the annual cost of Common ragweed can be very high. Therefore, ways to anticipate future invasions are desirable. One possible approach to forecast the future is to understand past-to-present invasions. In this study, we tested whether current Ragweed populations are randomly distributed, as a consequence of multiple independent introductions, or whether they show a dispersal gradient pattern from surrounding countries. To answer this, we combined species distribution models, dispersal models and population genetics. Dynamic dispersal scenarios initiated from Geneva and Chiasso are significantly more similar to the current distribution than the null model of random appearance. Preliminary population genetics analyses did not show a significant structure but more work is needed. These results show that only a dispersal scenario from limited few initial populations located at the Swiss border can explain the spread pattern in Western Switzerland and Ticino. Prioritizing management on these particular populations could be an efficient way to limit the further spread of Common Ragweed in Switzerland. In the future, the approach could be refined with more accurate dispersal parameters and realistic scenarios could then be derived to predict future spread pattern, pollen dispersal or management cost.

Keywords
Ambrosia artemisiifolia, Common Ragweed, Switzerland, invasive alien species, dispersal, habitat suitability, invasion, niche bases modelling, spread model, specie distribution model

Success of control measures against *Ambrosia artemisiifolia* in Germany

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Since 2005 an increased spread of common ragweed *(Ambrosia artemisiifolia)* is registered in different parts of Germany. By now, federal states in Germany tackle the topic *"Ambrosia"* in different ways: while some are active and installed control measures, research and monitoring programmes (e.g. Bavaria), others ignore the problem completely. Bavaria is a one of the few federal states in Germany which conducts a comprehensive action programme against common ragweed. Main results from the studies in Bavaria are presented here. Starting in 2006 with 18 known big ragweed (≥100 individuals per stand) stands in Bavaria the number of known stands increased to 189 in the year 2010. In 2007 approximately 60 % of the newly detected ragweed stands were found by private persons, whereas in 2010 the number of announcements by citizens decreased to ca. 20 % due to a decreasing interest of the media. Thus special search for the plant is necessary to detect the ragweed populations. In 2008 control measures against common ragweed in Bavaria were mainly carried out by the landowners on whose ground the plants grew or by the stuff of municipalities. Hand pulling was the most practised control method followed by mulching or mowing. A monitoring programme conducted in order of the Bavarian Ministry for the Environment and Public Health showed that in 2008 in 93.1% of the known big ragweed stands control measures were undertaken. The investigation demonstrated that complete removal of all plants is difficult and was achieved only in 17 % of all cases.

Keywords
Ambrosia artemisiifolia, success of control, monitoring, activities

Relevance of road margins for the spread of agronomic relevant weeds demonstrated by the example of *Ambrosia artemisiifolia* and *Setaria faberi*

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Habitats aside of roads often provide suitable growing conditions for weeds. Our investigations in Bavaria show that nine of the 16 most common plant species growing at road sides are weeds which usually occur in agricultural fields. Road sides can play an important role in the process of spread for weeds and the plants can enter agricultural fields from here. During the last years Common ragweed *(Ambrosia artemisiifolia),* originated in North America and Giant foxtail *(Setaria faberi)* which is native to Eastern Asia have been detected at road sides. Both species can cause agronomic damage and can lead to extra effort and expense during the cultivation of the fields. In 2009 and 2010 the distribution of common ragweed at the margins of federal highways in Bavaria was examined. In addition the distribution of Giant foxtail at the federal highway A94 in Bavaria over a length of 33 km was investigated in 2010. Results of the investigation show, that common ragweed occur at nearly all federal highways in Bavaria. Giant foxtail was found in 35 of the 500m-segments at the road side investigated. To prevent the spread of agronomic/economic relevant weeds at road margins gaps in knowledge of population dynamic, pathways of introduction, and extend and speed of propagation should be closed. Measures to control a new species are most successful in an early phase of spread.

Keywords
Ambrosia artemisiifolia, Setaria faberi, road sides, spreading routes

Session 6

Impacts to and answers from human society versus plant invasion

Oral presentations

Keynote

The perception and management of invasive plants: Between environmental and social changes

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The concept of "invasive species" was first coined by ecologist John Elton in 1958, but only became common in scientific research in the 1980s. The 1992 Rio Declaration pointed to biological invasions as one of the primary causes of declining biodiversity. However, the concept of biological invasions is not universally accepted among conservation biologists and managers of protected areas. Further, the concept and the controversies which surround it have moved beyond the purely scientific realm and generated reactions, attempts at appropriation and criticism from, inter alia, users, inhabitants, farmers and consumers.
The sociological analysis put forward in this presentation is based on qualitative data gathered from managers, decision-makers, experts and inhabitants in the South of France2, as well as an extensive literature review of international scientific research.
The ways in which the concept of biological invasions is used socially shed new light on the relationship between humankind and nature. Nature is redefined as fluctuating; rare in some places, proliferating in others; different today from tomorrow; sometimes threatened, sometimes threatening. Given this, the debate over biological invasions offers a particularly good example of the interpenetration of social and environmental change.
The taxonomic debate and the socio-technical controversies related to biological invasions challenge the dichotomous and unidirectional order of humankind's relationship with nature. Furthermore, the concept of biological invasions has rekindled and revamped the great myths of Western society in which nature and its fluctuations are at once a subject of fear and control and subject to idealisation.

Keywords
invasive plants, Rio, biodiversity, sociology

IASwatch under eyeonearth

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Prevention, early warning and containment are the three steps of invasive alien species (IAS) strategies. Monitoring is one of the key elements of every stage. Improvements in internet and communication technologies (IT) lead involvement of citizens on monitoring and surveillance activities, which are costly. European Environment Agency has initiated citizen science activities by introducing Eye on Earth (EoE) which is an exploratory web-based IT platform for user-friendly, two-way sharing of environmental data and other environmental information with the general public and the scientific community. Current applications are Airwatch and Waterwatch. There is also the intention to develop other environmental watch activities including invasive alien species watch (IASwatch) under the Naturewatch, which will be started as a pilot project in 2011. The project aims monitoring and surveillance of invasive alien species, supporting policy activities in Europe and targets of Convention on Biological Diversity, and raising awareness in general public. A group of IAS experts has been determined criteria to choose species for IASwatch. However, no organism has been chosen. It is expected that some plants species will be included in the pilot phase and later stages of the project.

Keywords
environment, europe, iaswatch

Prioritization of alien plants for risk analysis

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Invasive alien plants are recognized as a problem of growing importance in Europe as alien plants are still being introduced deliberately or involuntarily. In order to reduce the threats of new plants becoming invasive, risk analysis should generally precede the importation or planting of species. It is also applied to support decisions about eradication or containment measures against invasive plants. For risk assessment, an EPPO (European and Mediterranean Plant Protection Organisation) pest risk assessment (PRA) scheme is available. The scheme follows the internationally acknowledged IPPC standard. As a full pest risk assessment is a time-consuming task and the candidate species are numerous, a prioritization of alien species for PRA is necessary. As there is no existing widely agreed method to identify those alien plants that are considered invasive and represent the highest priority for pest risk analysis such a prioritization process was developed in the framework of EPPO's ad hoc Panel on Invasive Alien Species. The process is designed to produce a list of invasive alien plants that are established or could potentially establish in the EPPO region and to determine which of these have the highest priority for PRA. It consists of compiling available information according to pre-determined criteria. We introduce the main principle of the process and show the results of running the process with different sets of example species.

Keywords
invasive alien plants, EPPO, risk assessment

Lists of invasive alien plants – a tool for implementing?

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Nowadays, in most countries, including Switzerland, invasive alien species are classified in lists based on their damage potential. Already in 2004, a group of experts drew up a classification key allowing the sorting of neophytes in a Black List, a Watch-List or in no list. Based on this key, the Swiss Commission for Wild Plant Conservation, has recently formulated a series of questions concerning the main criteria, like : the potential of invasion, the health risks for human being and animal, the impacts on native species and natural habitats, the impacts on human activities and control measures. The answers should allow an objective and traceable classification of the species. On this basis, the lists were updated and extended with species not yet established in Switzerland. This system requires detailed knowledge about the species like occurrence, dispersal mechanisms, biology, ecology and ranking in other countries. If these acquirements are available, species can be classified; if not, gaps are shown up and must be corrected. This instrument is not a substitute for risk assessment studies. The goals of the evaluation scheme are much more in the objectivity and traceability. The lists obtained in this way are useful for information dissemination, support the correct handling of alien species, are a tool for decisions concerning implementation of preventive and control measures, and maintain the legal bases. Due to advances in knowledge and field experience as well as changes in spread and impacts, the lists have to be reviewed and updated regularly.

Keywords
Black List, criteria, classification key

Status of knowledge on invasive species in Mexico: future steps

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The constant movement of species of fauna and flora across biogeographical boundaries, as a consequence of global trade and communication, has caused the establishment of a number of non-indigenous species in new areas, in which they have become invasive and caused severe damage to ecosystems, productive activities and human health. These species have been recognized as one of the main causes of biodiversity loss, their impacts include damaging vulnerable populations of flora and fauna, altering ecosystem functions and causing loss of environmental services, which eventually causes harm to human well-being and loss of natural assets and wealth. Mexico has been no far from this phenomenon, with a series of high profile cases requiring attention over the last few years. The National Commission for the Knowledge and Use of Biodiversity (CONABIO), which acts as an advisory body to the Mexican government, has been required to gather, analyze and provide information regarding the status of the invasive species in the country, in order to support decision making on prevention, control and eradication actions. Since 2007, CONABIO has been developing the National Invasive Species Information System (NISIS), which is a component of the National Biodiversity Information System (NBIS). This work will present the diagnosis of the state of knowledge on invasive species for Mexico as well as its gaps, and suggest possible strategies to move forward in filling those.

Keywords
Information System, Diagnosis and Analysis, Mexico

AGIN a working group of the cantonal authorities of Switzerland to coordinate their reaction concerning neobiota

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Confronted with increasing number of problems to manage invasive alien species and gaps in the administrative law, the federal government of Switzerland has passed a revision of the Ordinance on the Handling of Organisms in the Environment (Release Ordinance, RO) 2008. Beside the use of pathogenic and genetically modified organisms this regulation work includes now the field of the alien species as well. Later the Swiss conference of the heads of the 26 offices of environment formed a working group (AGIN) to harmonize the execution in the different Kantons. The AGIN first met in 2009. The group identified the following goals: To overview the stakeholders, to identify prior problems, to provide a basis for a national strategy for the management of invasive alien species, to coordinate national activities and to exchange know-how. Four subgroups in collaboration with experts and concerned trade unions work intensively on the identified prior problems. One group develops solutions for the handling with biological contaminated soil (mainly knotweed). A second group works on recommendations to the best method to eradicate the worst species in Switzerland. Another group informs the whole chain of traders of plants. Finally another group works on management strategies to deal with invasive alien animals. Due to the complexity of the involved authorities and of the individual biology of each species success proceed slowly. Yet there are some interesting results to report.

Keywords
invasive alien species, management, administration, Switzerland

Evolution of prevalence of ragweed pollinosis in Europe: studies or estimations, 1987–2010

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In the world, only one study about the relationship between the concentrations of ragweed pollen and the prevalence of ragweed pollinosis was realized, it was in Québec. The question of ragweed pollinosis (with or without asthma) prevalence in Europe is often asked and is difficult. Symptomatology of pollinosis includes a lot of symptoms, rhinitis represents only one of them. There is a lot of publications about ragweed rhinitis or pollinosis but studies about *prevalence* are uncommon. To understand the European situation in a meta-analysis, it is necessary to distinguish different kinds of publications: studies where authors tell about the percentage of ragweed pollinosis, either by comparison with the total number of pollinosis or of respiratory allergies treated in their patient's departments or evaluations without epidemiological study or hypersensitivity studies or epidemiological studies. We present this meta-analysis where they were published: Central Europe, Switzerland, Northern Italy and the Rhône valley in France. In these countries of the Ancient World, the increase of this allergy is clear. But because of climate change, the weed begins to grow in other countries, we must not wait if we hope to stop this invasion. Epidemiological studies are difficult to do without bias. As now European Union is interested in ragweed subject it would be important to do only prevalence studies in each polluted country with a common protocol. It is necessary to persuade medical experts to do these studies everywhere, even in new polluted areas where this allergy begins to be observed.

Keywords
Common ragweed, prevalence, pollinosis, asthma, Europe

Session 6

Impacts to and answers from human society versus plant invasion

Posters

Three tools to manage exotic weeds – a proposal

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Information on exotic weed species interfering in agricultural and non agricultural zones is manifold, but is always directed to a certain objective, with a certain background. Many leaflets on weeds might appear incomplete to the reader. General guidelines are needed to concentrate financial and human resources for invasive alien species. Three elements – a collection of weak point sheets for noxious native 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 civil servant in any region to choose adequate control methods. Practical tools on the control of invasive and other noxious plant species are proposed. The first tool consists in a sheet per plant containing an exact description of the weak points in the life cycle of the species. A collection of sheets would address all species relevant for a certain region or country. The second tool is a list containing details on costs of machines, labour and additional efforts for control methods. This must be adapted to each country situation, and it must be updated regularly. The third tool is a list containing detailed information on restrictions – adapted to a region or country – for the use of herbicides or other control methods in all existing zones such as water surface, water lines, forest, traffic lines, public and private green, agricultural, horticultural, industrial and residential zones, unproductive zones in mountain areas and others.

Keywords
invasive plants, weed control, information, *Solidago, Ambrosia, Cyperus*

The environmental and socioeconomic effects of the invasion of water hyacinth (Eichhornia crassipes) in Lake Victoria (Kenya).

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Water hyacinth *(Eichhornia crassipes),* has been in Africa since 1870's and was reported in Lake Victoria in 1989. Water hyacinth, a member of the pickerelweed family (Pontederiaceae), is native to tropical America. It is an invasive non-native floating perennial with thick, glossy leaves that are obovate to lanceolate with lavender flower spikes. It has posed serious environmental and socioeconomic problems in the use and management of water resources within Lake Victoria in Kenya. Due to lack of natural enemies to check the plant's growth and the high pollution levels in the lake, the plant quickly spread to attain a peak infestation of 17,200 ha by 1998. Over the years, the weed has continued to proliferate, forming extensive floating mats that cause disruption in irrigation canals, navigation and fishing activities. It has reduced the supply of clean potable water and has provided breeding grounds for schistosome (bilharzia)-carrying snails and malaria-carrying mosquitoes. The cost of its infestation is estimated to be of the order of millions of Kenya shillings. Reportedly, it has also increased disputes between local communities and reduced tourism. Lake Victoria is becoming more eutrophic, and this might have been a factor in the successful invasion of the weed as it has a high nutrient requirement. Management methods include use of herbicides, physical control by hand pulling and biological control by use of *Neochetina* weevils. However, these management methods will remain an integral part of a community-based, multi-sectoral water hyacinth management programme.

Keywords
Water hyacinth, invasion, socioeconomic effects

Identification and prioritization of invasive alien plants "hotspot" areas in Gauteng, South Africa.

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Understanding the potential distribution ranges of emerging invaders in South Africa aims to Facilitate identification of those emerging invaders with the greatest potential to expand their ranges in southern Africa. This will allow protected area managers to focus action and monitoring efforts on the area's most vulnerable to invasion. Research is needed to understand, monitor, and model parameters that may be Favorable to invasions, as examined climatic conditions, ecosystem disturbance patterns, and land use changes. Baseline research is needed to Determine if a species is „new" to and from area to detect changes in pathways. Scientifically sound information is essential to support detection programs. This study was conducted in Gauteng. Information from the Southern African Plant Invaders Atlas database, National Spatial Biodiversity Assessment and Environmental Impact Assessment data as well as reviewing information on permits issued for introduction of plants in South Africa Which combined to create a comprehensive list of invasive alien plants in Gauteng. Information in the new list was verified and or added to through selective field surveys. The distribution information was mapped using GIS and Turboveg to identify the „hotspot" areas and potential distribution of invasive alien plant species in Gauteng. Even though some results are still pending this study is the beginning of the development of a scientifically sound information database for the early detection of invasive alien plant species.

Mexican strategy for invasive alien species: a first step to coordinate activities among different sectors

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Even if Mexico has a well established legal and technical framework to manage pests and quarantine procedures for plants, the structure of the environmental legislation is somewhat different. Environmental legislation has provided only general guidelines to regulate the problem of invasive alien species (IAS) so far. To address this gap the National Law for Environmental Protection and the General Law of Wildlife were recently modified to include the issue. This is a first important step however, further modifications will be necessary in the near future to address the problem in a more comprehensive way. Consistent with the situation of the regulation deficits, actions against IAS have been isolated with focus on impacts on agriculture particularly on pests of crops. The National Strategy for alien invasive species developed by the Ministry of Environment tries to overcome this scattered approach with the objective to contribute to the conservation of the natural capital and human well-being through actions oriented towards prevention, control and eradication of IAS. It is designed to align and coordinate the efforts of a broad range of governmental agencies and stakeholders; one of the main issues that will be addressed by this strategy concerns the challenges posed by terrestrial and aquatic invasive weeds which constitute 70% of the IAS registered for the country. Advances have been made regarding the development of priorities to establish a National Weed Management Strategy. The publication of the National IAS strategy for Mexico provides a solid framework to convert these identified priorities into actions.

Keywords
Legislation, Collaboration, Weed Strategy, Mexico

Distribution of invasive alien woody plant species in Hungary

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The mapping of the Hungarian flora in the whole country has done within the framework of the Mapping of the Hungarian Flora Programme as a part of the project "Mapping of the Central European Flora". The surveyors completed a Quadrant Data Sheet which contains all the species observed in grid cells and also filled out an Invasion Data Sheet which shows the occurrence of all invasive plants, the expanding of invasive species and to enable the documentation of further characteristic of these species. Semi-natural and valuable treeless habitats are dangered by the spreading of invasive woody plants. In woody associations the expansion of invasive species canopy, shrub layer, and the big biomass quantity of its roots has strong allelopathy and competitive effect on other plants. Invasive woody species transform efficiently the ecology of habitats than the invasive herbaceous plants. Analyzing the current distribution of invasive woody plants is indispensable requirement of nature protection work. In this study we mapped some species has already spread in large areas which are the followings: black locust (*Robinia pseudoacacia* L.), tree of heaven (*Ailanthus altissima* [Mill.] Swingle), common hackberry (*Celtis occidentalis* L.), Russian olive (*Eleagnus angustifolia* L.) and green ash (*Fraxinus pennsylvanica* Marsh.). We can conclude from these maps, which regions are dangered in the close future by these invasive plants.

Keywords
invasive alien woody plants, distribution map, habitat preference, Hungarian Flora Programme

Progress on DAISIE: ALIEN species inventories in Europe updated

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In Europe, a unique alien species inventory with more than 11,000 alien species has been produced by the DAISIE project (DAISIE 2009). First analyses based on DAISIE data revealed alarming trends of increasing numbers of newly naturalized species across all groups of organisms. These data also enabled us to analyse the socio-economic aspects of invasions at European scale, the habitat-specific invasion patterns on the level of individual taxon groups, and the increasing loss of European uniqueness due to invasions of alien and extinctions of native species. The strength of such an inventory is its completeness in terms of a wide range of organisms covered; however, for obvious reasons such amount of data requires regular updates should it not be soon outdated. The ALIEN project (Analysing Large-scale Invasion patterns using European Inventories - Update and Analysis of European Database of Alien Species; supported by CRUS-SCIEX) was initiated in 2010 to keep the DAISIE database up-to-date, by including additional species lists from some understudied regions of Europe where regional lists of aliens started to be developed during the DAISIE project. The ALIEN project has three main goals: (1) updating the DAISIE database by using new regional species inventories, (2) populating the database with information on selected species traits, and (3) analysing the updated database, with focus on the role of species traits and their residence times in determining the distribution patterns and invasion success of alien plants and animals in Europe.

Keywords
DAISIE, alien inventories, Europe

Towards a strategy in Ticino

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The Canton of Ticino is heavily concerned with neophytes and other foreign organisms. This is due to its geograpfic and climatic situation, a long tradition with tourism, and transportation facilities connecting southern with norther Europe accross the Canton. A working group of the local authorities is in charge to propose a strategy to implement the federal Ordinance of 10 September 2008 on the Handling of Organisms in the Environment (Release Ordinance, RO). The presentation (or a poster) will give an overview on the local situation, the legal frame, what has been done so far and the probable next steps.

Keywords
Strategy, Ticino, impact, response

Introduction and agro economic value of *Galega orientalis* Lam.

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Fodder galega (*Galega orientalis* Lam.) is native species of Caucasus forested slopes and river valleys belonging to the family of Fabaceae. It is especially valuable perennial and productive crop with unique chemical composition galega, thus, is a very promising crop in Lithuania and in other countries with similar geo-climatic conditions. Sound adaptability to growing conditions is characteristic to fodder galega. It can grow in all types of soil except in the waterlogged ones. Nonetheless, galega is more resistant to high water-level than lucerne. Due to important biological properties of galega it can be used for socio-ecological proposes, namely to improve soil fertility by accumulating nitrogen; enriching with organic matter and increasing the amount of humus; to decrease soil permeability, erosion; and for soil preservation. *Galega* is excellent quality forage for all kinds of livestock and poultry. Duration of seed maturity lasts only for 102–112 days at accumulated temperatures of 1800 C (41.9 MJ m^{-2}). Due to productivity, ability to grow for a long time (>20 yrs) in the same place and fast re-growth in spring, seed ripening and high resistance to pest this crop successfully surpasses traditional leguminous fodder crops in temperate climate. Galega show allelopathic activity as a natural protection. Biological peculiarities of this useful deliberately introduced species were found to possess good adaptive ability and are potentially significant for naturalization. Nonetheless, galega has not spread or establish itself in natural habitat and plant communities during introduction period of more than 30 years in Lithuania.

Keywords
Galega, introduction, agro economic value

Detailed map of Ascona