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Switzerland and the invasive plant species issue

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Abstract

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The increasing number of naturalized non-native plant species with a negative ecological impact on the communities where they grow (invasive species) is viewed as a major component of global change and is an important topic of current ecological research. In most regions of the world, the number of alien species is increasing as a result of trade, tourism, and disturbance, thus increasing the likelihood of plant invasions. Several international organizations have incorporated the invasive plant species issue in their main activities and have formulated guidelines for the management and eradication of invasive species. Switzerland as a central European country does not have as many invasive species as for example countries of other continents; however, some species are regarded as being invasive and are of special concern due to the highly fragmented and intensively used landscape. With the exceptions of the Alps, wildlife and areas of high conservation value are restricted to usually small areas, surrounded by heavily disturbed habitats or urban areas. In such places, invasive plant species may pose additional threats to the native diversity. Species of high concern are for example the north American *Robinia pseudoacacia, Solidago altissima, S. gigantea,* and the Asian species *Impatiens glandulifera* and *Reynoutria japonica*. In this article, the invasive species issue is highlighted with regard to the Swiss flora, and the needs for actions are discussed.

Keywords: Exotic species, plant invasions, Switzerland.

Plant invasions – a threat to biodiversity

The spread of non-native plant species into natural communities with subsequent negative effects on these ecosystems are a significant component of global change (Drake et al. 1989, Vitousek et al. 1997). Successful invaders can affect the invaded communities in various ways, e.g., reducing local diversity, driving rare native species to extinction (e.g. by competing or hybridising with them), changing habitat structures and ecosystem functions, and changing disturbance regimes such as fire frequency. Humans have been altering the composition of vegetation for a long time and are still doing it at a massive scale through disturbance (forest clearing, conversion to agriculture, burning, pollution) and through the deliberate or accidental movement of species beyond their native ranges. As Mack (1997) points

out, plant invasions represent an aspect of global change that has already occurred and led to permanent alterations of vegetation. The role humans play in altering natural ecosystems, including the mixing of biota across dispersal barriers, was recognized as early as 130 years ago by George Marsh's book "Man and Nature; or Physical Geography as Modified by Human Action" (Marsh 1865). The phenomenon of biological invasions was later outlined in detail by Elton (1958). Yet, it was the Scientific Committee on Problems of the Environment (SCOPE) that launched a project on the "Ecology of Biological Invasions" and made the issue an important focus of ecological research (Mooney and Drake 1986, Drake et al. 1989, Di Castri et al. 1990).

Plant invasions clearly have increased in their significance as a threat to biodiversity during the last decades. The number of naturalized exotic plant species has been rapidly increasing in many regions of the world during the last 100 years (Rejmánek and Randall 1994, Kowarik 1995) as a result of increasing trade volume and tourism across the globe, and urbanization. In California, for example, the number of naturalized alien plant species increased from 150 to 1000 between 1900 and 1990 (Rejmánek and Randall 1994). Simultaneously, rare species are declining and becoming extinct. In addition to direct effects of invading on rare species, these two processes often are influenced by the same factors, e.g., fragmentation, disturbance of ecosystems, and habitat degradation.

Plant invasions are of varying intensity and significance across the globe. Oceanic islands are probably the places where plant invaders have the most detrimental effects on native biota (Vitousek et al. 1997), because island biota are often depauperate and less competitive than mainland species. Other areas where plant invasions are a major threat to the conservation of native diversity are Australia and New Zealand (Groves and Burdon 1986, Rozefelds et al. 1999), South Africa (Macdonald et al. 1986), and western North America (Anonymous 1993).

In Europe, plant invasions seem not to have such large extents as in other continents (Mack 1997). The reason is probably that in Europe much less undisturbed and pristine natural areas are present than in other regions of the world. However, because the European landscape is densely populated, highly fragmented and urbanized, natural areas are often confined to small remnants. Here, exotic species may pose additional threats to the conservation of native diversity. Despite an apparent lower invasibility of plant communities in Europe (Di Castri 1990), there are species mainly from North America and Asia that are considered to be invasive and a threat to native plants (Di Castri et al. 1990, Pyšek et al. 1995, Luken and Thieret 1997, Starfinger et al. 1998). Some important plant invaders of Europe are given in Table 1. Most of them also occur in Switzerland.

Much ecological research is now devoted to biological invasions (Pyšek et al. 1995). Two major questions are: 1) What makes a species invasive? 2) What are the characters of a community that make it susceptible to exotic species invasions? In addition, there is increasing demand for the development of measures to prevent the establishment of new plant invaders in a region as well as their spread (Zamora et al. 1989, Randall 1996, Clout and Lowe 1997, Reichard and Hamilton 1997).

This article gives a brief introduction to the mechanisms and effects of plant invasions and discusses their significance for the Swiss landscape and its flora. Possible measures towards a better understanding and management of invasive plant species in Switzerland are then outlined. First, some commonly used terms will be defined.

Table 1. Some exotic plant species that are considered as invasive in Europe. After Weber and Schmid (1993), and Cronk and Fuller (1995).

Species	Lifeform	Origin	Habitats
In Switzerland present:			
Heracleum mantegazzianum	Perennial herb	Former USSR	Bush, forest edges
Impatiens glandulifera	Annual herb	Himalaya	Riparian habitats, wet places
Prunus serotina	Tree	North America	Forest edges
Reynoutria japonica	Perennial herb	Asia	Bushes, riparian habitats
Robinia pseudacacia	Deciduous tree	North America	Forests, riparian habitats
*Solidago altissima**	Perennial herb	North America	Meadows, forest edges
Solidago gigantea	Perennial herb	North America	Forest edges, riparian habitats
In Switzerland not present:			
Crassula helmsii	Aquatic herb	Australia	Lakes, ponds
Rhododendron ponticum	Shrub, small tree	Caucasus	Oak forests

* Syn.: *S. canadensis* var. *scabra* (see Weber 1998).

Terminology

Probably no field in ecology is prone to so much variation in the use and understanding of terms like "invasive", "introduced", or "alien" as the field of biological invasions (Pyšek 1995). Therefore, these terms will be defined here for the purpose of this article. The definitions were taken from the guidelines for the management of invasive species, as given by the International Union for the Conservation of Nature (IUCN; see http://www.iucn.org/themes/ssc/memonly/invguide.htm).

- *Native (indigenous) species (taxon):* – "A species, subspecies, or lower taxon occurring within its natural range and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans)".
- *Alien (exotic, introduced, foreign, non-indigenous, non-native) species (taxon):* – "A species, subspecies, or lower taxon occurring outside of its natural range and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce".
- *Invasive species (taxon):* – "An alien species which becomes established in natural or semi-natural ecosystems or habitats, is an agent of change, and threatens native biological diversity".

It must be stressed that the term "invasive species" refers to species penetrating into natural and semi-natural areas and to those that have negative effects on the community. Such species are also called environmental weeds or wildland weeds (Pyšek 1995, Randall 1996). Weeds of agricultural areas do not belong to this group of plants, because they mostly differ in their ecological requirements and cannot grow outside cultivated fields (Mack 1997). It must also be stressed that under the influence of man, native species can pose problems as well (e.g. in disturbed habitats). Examples are *Phragmites australis* and *Rubus* spp., which are often controlled in protected areas. Most of the invasive plants, however, have an exotic origin.

How does a plant invasion occur?

The spread of an exotic species into a new region is a dynamic process, and can broadly be grouped into the stages introduction, establishment, and subsequent spread. An invasion always starts with the introduction of a species, whether seeds, living parts, or whole plants, into a new area. The movement of a species beyond its natural range is always assisted by man – either intentionally or accidentally. Intentional introductions comprise all species brought in from another region for a special purpose (biological control, food, fodder, ornamental, timber). Accidental introductions typically occur as a result of trade and tourism. For plants, examples are propagules in the ballast water of ships, hitchhikers on soils or intentionally introduced animals and plants, seed contamination, propagules carried and dispersed by vehicles, and seeds in packing material. Thus, it is not surprising that a high concentration of aliens are found at ports and railway stations (Waldburger 1997).

Introduction does not mean that the species will become permanently established and naturalized. Most of the introduced species fail to reproduce or to grow outside the locations where they have been cultivated (crop fields, gardens, parks, pastures). Many introduced species depend on permanent propagule import in order to persist (casuals). Once the introductions have ceased, these species will disappear.

Alien species becoming naturalized and established must be able to reproduce and to form sufficiently large populations before spread can take place. It has often been observed that alien species do not spread for quite long times after their introduction, until a sudden range expansion occurred (Kowarik 1995, Williamson 1996). Such lag-phases may last for more than 100 years (Kowarik 1995).

Once established, the successful spread depends on the number and size of available habitats for colonization and on the species' ecology. A key factor promoting the spread of alien species is thaught to be disturbance (Crawley 1987). Disturbance, for example by forest clearing, flooding, constructions, opens the vegetation and provides microsites where establishment of an alien species can take place. Of equal importance are the number of "infestation sites", places where the species was planted, and from where spread can begin. The overall rate of spread of an alien species is correlated with the number of infestation points, which means that the spread is faster if the species was grown at many widely dispersed sites (Auld and Tisdell 1986). An example are the goldenrods *Solidago altissima* and *S. gigantea* in Europe. These North American species were widely cultivated in botanical and private gardens, from where they escaped. Man acting as long-distance disperser certainly contributed to the rapid range expansion of these species in Europe (Weber 1998). In addition, the spread is often facilitated by roads and railways along which the species can migrate. These constructions provide disturbed and open sites which can be colonized. In summary, the rate of spread and the local abundance, as well as the interactions with the native species together determine whether an alien species is becoming invasive or not.

Only a small fraction of all naturalized aliens of a region are becoming invasive (less than 1% according to Williamson 1996). However, the more alien species are present in a region, the greater the likelihood that some of them are or will become invasive. Considering the whole alien flora of a region, several classes according to their invasion success (local abundance and geographic range) can be distinguished. In the Swiss flora, the fraction of species in the different classes becomes lower with increased invasion success (Weber 1999).

What makes a plant species invasive?

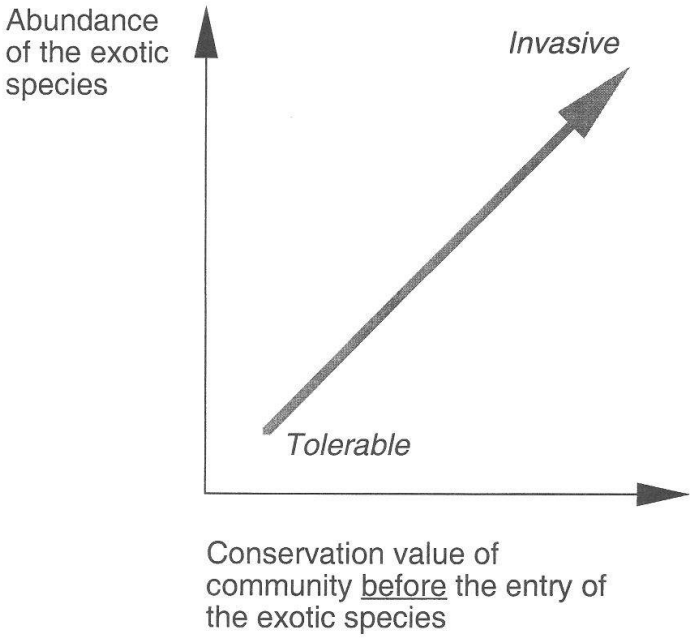
This question was a focal point during the SCOPE meetings mentioned above. So far, the answer is not easy because generalizations are difficult if not impossible (Mack 1997, Williamson 1999). It is clear that "invasiveness", i.e., the kind of negative impact an exotic species has, depends on many factors. These comprise species traits and community traits, as well as our perception of the weediness of a species. A successful invader must be the better competitor as the native species, otherwise the alien species won't be able to have a population growth that is higher than that of the native species. This might explain why among annuals, only large species such as *Impatiens glandulifera* appear to be successful colonizers. A successfully invading species may also occupy a somewhat different niche that is not occupied in the respective habitat. An example is the nitrogen-fixing tree *Robinia pseudacacia* which invades forests and grassland in central Europe (Kowarik 1991). Characters that are widespread and common among plant invaders are related to physiology and ecology, but include also biogeographical aspects (Table 2).

The question whether an alien species is invasive or not also depends strongly on the place where it grows and on our perception of the value of this place, that is the community and its conservation value (Williamson 1999). Even if the population dynamics would be constant,

Table 2. General characteristics of invasive plant species. After Roy (1990).

Physiology and ecology
Great longevity of seeds
No specific germination requirements
High relative growth rate
High acclimation potential
High phenotypic plasticity
Early reproductive maturity in trees
High seed output
Vigorous vegetative growth in perennials
Absence of natural enemies
Demography
High population growth rate
Effective seed dispersal
High transition probabilities between at least two stages of the life-cycle
Genetics
High genetic variation
Self-compatibility, wind pollinated or unspecialized pollination
Biogeography and taxonomy
Large native range
Species belongs to unspecialized families
Experience
Species has weedy congeners
Species is a weed elsewhere

Fig. 1. The question whether a plant species is invasive depends on its local abundance and the ecological value of the community into which it penetrates. An alien species with a high abundance is a threat and is considered as invasive if the community is very species rich or contains rare species. Aliens with low abundance might be tolerable in places with low conservation value.

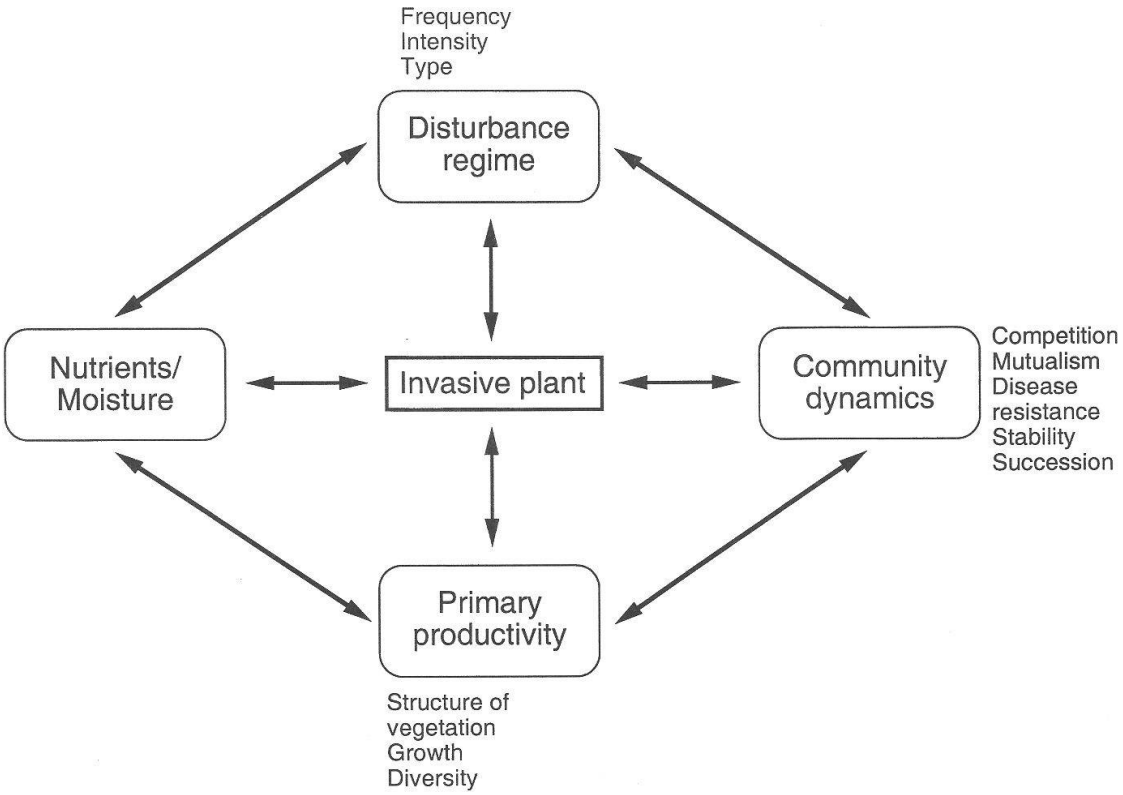


a species might be non-invasive in one place and invasive in another. This is illustrated in Fig. 1. Alien species that reach a high abundance within an area with a high conservation value (for example presence of rare species) may be called invasive because the alien species suppresses the native vegetation and thus interferes with the conservation aims. In areas with low native diversity or "less" valuable native species, the presence of alien species might be tolerable if its abundance is relatively low. These explanations make it clear that the effects of invasive species must be looked at the community and species level, and require quantitative measurements of "invasiveness". The outcome of the interactions between the native and the alien species ultimately determine whether a species is invasive or not.

What are the effects of invasive plants?

An invasion can be viewed as a succession towards a community that did not exist before, and the extensive spread of invasive plants may result in a wide range of changes of the invaded communities and ecosystems. These can broadly be grouped into direct and indirect effects on the native species and their interactions, and include effects on primary productivity, nutrient dynamics, soil moisture conditions, disturbance regime, and community dynamics (Fig. 2). Each of the ecosystem processes indicated in the figure may be intensified or weakened in the presence of aliens. For example, soil nitrogen might increase in a grassland invaded by the nitrogen-fixing tree *Robinia pseudacacia.* If invasive plants don't have direct ecological effects on soil properties or the composition of the fauna and flora, they always have the effect of occupying space that otherwise would be available to native species. This becomes important if the alien species forms large and dense populations, covering large areas with "monocultures". In such populations, native species richness is strongly reduced, as

Fig. 2. The various effects alien plant species can have on communities. Arrows indicate interactions. Each of the community properties and ecosystem processes can be increased or weakened by the presence of alien species. Modified from Walker and Smith 1997.



for example in the case of *Solidago* spp. (Voser-Huber 1983, Weber and Schmid 1993). Besides this reduction of species richness within stands of the alien species, large areas covered by aliens may also reduce richness *outside* the population by reducing the remaining area that is available to native species. This may lead to a decrease in population size of native species and may be of significance in the case of rare species. Biogeographic theory predicts that the number of species present decreases if the area is getting smaller (MacArthur and Wilson 1967).

Alien and invasive plants in Switzerland

Extent and origins of the alien flora

The Swiss flora contains about 300 naturalized alien vascular plant species that make 11% of all vascular plants in Switzerland (Weber 1999). They form a highly diverse group both in its origins and taxonomic composition. The aliens are represented by 72 families, out of which 15 contain no native species (Weber 1999). As shown for other floras, some families have disproportionately many aliens; in the case of Switzerland the Amaranthaceae, Polygonaceae, Rosaceae, and Brassicaceae. Most of the alien species originate from North America and Asia (Fig. 3). Although most of the aliens are annuals and herbaceous perennials, there are also some woody species and aquatics (Table 3). The woody plants are mainly escaped and naturalized ornamentals; examples include the trees *Ailanthus altissima*, *Acer negundo*, and *Ro-*

Fig. 3. The origins of the alien flora in Switzerland (%). Only species that are naturalized were included (no casuals). "Other" refers to species whose origin is not known or could not unambiguously determined.

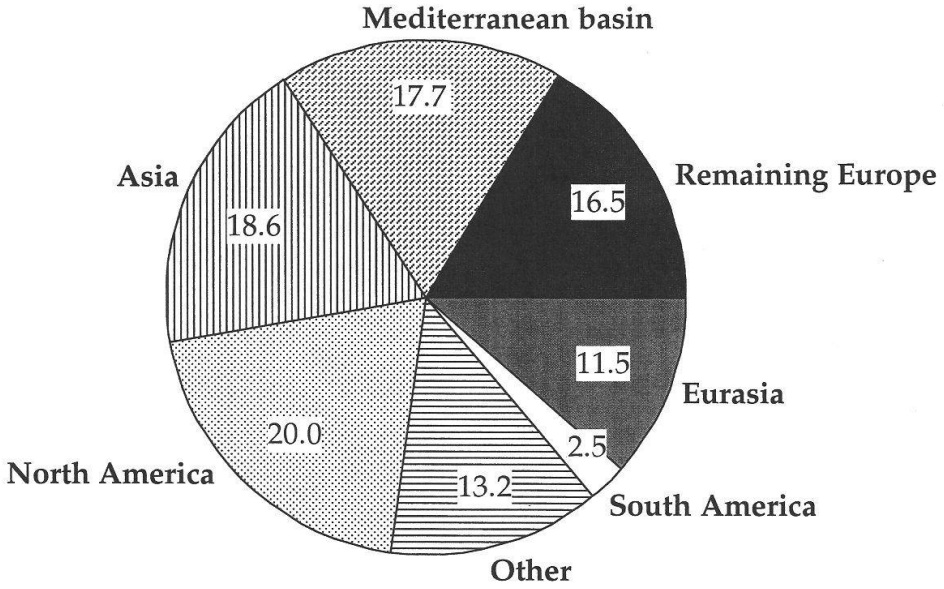


Table 3. Lifeforms of the alien plant species in Switzerland.

Lifeform	N	%
Annuals	65	21.4
Woody plants	59	19.4
Hemicryptopyhtes	54	17.7
Geophytes	45	14.8
Biennials	43	14.1
Chamaephytes	20	6.6
Aquatics	9	3.0

Table 4. Number of alien plant species in various habitats of Switzerland.

Habitat	N
Ruderal places	122
Rocky places, walls	56
Forests, forest edges, bushes	55
Lakes, riparian habitats	45
Arable land	38
Meadows, pastures	24
Wetlands	6
Dry meadows	4

binia pseudacacia. Considering the habitats where alien plants occur, it is not suprising that the highest number of alien species is found on man-made and heavily disturbed sites such as ruderal areas (Table 4). There is a general decrease in the number of alien plants from disturbed and open to more closed and nature-like habitats (Weber 1999).

Invasive plants of Switzerland

Large parts of Switzerland have been converted to agriculture and areas supporting valuable native plant communities were drastically reduced. For example, almost 90% of the Swiss wetlands have disappeared since 1800 (BUWAL 1998). The decrease in the area of dry meadows (Mesobrometea, Xerobrometea) after 1945 is about 90%. The remnants of such formerly widespread communities may especially be vulnerable to plant invasions. It is not surprising that some exotics considered as invasive are penetrating into these vegetation types (*Solidago* spp., *Impatiens glandulifera*).

Although most of the alien plants have low abundances and are restricted in their ranges, there are some few exotic plants which are very successful and have reached a considerable distribution in Switzerland since their introduction. These are viewed as problem plants due to their ability to form dense monoculture-like communities with a strongly reduced diversity (Schmid 1989). Some important plant species that are considered as being invasive in central Europe are listed in Table 1. In Switzerland, the North American goldenrods *Solidago altissima* (Syn. *S. canadensis* var. *scabra*) and *S. gigantea* belong to the most widespread exotics and are considered as invasive (Voser-Huber 1992). Both are rhizomatous perennials and were introduced into Europe as ornamentals. They were extensively distributed by man within Europe and soon escaped places of cultivation. In Switzerland, first spontaneous occurrences date back to 1860 (Voser-Huber 1983). The spread of these species occurred mainly along rivers and was facilitated by depositing garden waste containing rhizomes of goldenrods. Several characters allow the species to form dense monocultures, thus causing problems in protected areas of the Swiss plateau: prolific seed production, extensive clonal growth by rhizomes, high shoot density, and absence of natural enemies. Their negative impact consists of the formation of dense monocultures that bear a very low species richness (Voser-Huber 1983, Weber and Schmid 1993). Goldenrod populations can cover large areas but in many instances, they can be controlled by mowing (Hartmann et al. 1995, Stoll et al. 1998, Meyer and Schmid 1999 a,b).

Impatiens glandulifera, a large annual from the Himalaya, was introduced as an ornamental and is now a widespread plant of disturbed riparian habitats. Due to its effective seed dispersal mechanism, it is a successful colonizer and population density can be high, thus supressing native vegetation. There are no detailed studies on the impact of this species in Switzerland.

Other species that are likely to have negative effects on the native vegetation include the species *Heracleum mantegazzianum*, *Reynoutria japonica*, and *Robinia pseudacacia*.

The necessity for action

The threat exotic species pose to biodiversity has been recognized as a global environmental problem and is a major theme for the activities of international organizations such as IUCN (McNeely 1997). The invasive species issue was also incorporated in the Convention of Biological Diversity (launched by the United Nations Environment Programme in 1992), which Switzerland has signed. Article 8 (In-situ conservation) says:

Each contracting party, as far as possible and as appropriate, shall:

- (h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

Within the scientific community there is broad agreement that invasive species must be controlled or eradicated if necessary, especially in hot spots of diversity such as islands and

mediterranean climate regions. Furthermore, it has been recognized that the best control would be the prevention of their establishment (Zamora et al. 1989).

In Switzerland, species that should be (and sometimes are) controlled are the two goldenrods mentioned above. There are, however, further needs for action towards a better understanding and management of invasive species in Switzerland, e.g., surveys, legislation, increasing awareness, and prevention.

Surveys

Whereas much information has been obtained for the two goldenrod species (Schmid 1989, Voser-Huber 1992, Meyer and Schmid 1999a,b), the status of many exotic species including *Heracleum mantegazzianum*, *Impatiens glandulifera*, *Reynoutria japonica*, and *Robinia pseudacacia* with respect to their invasiveness is not well documented for Switzerland. Here, detailed field surveys are necessary in order to evaluate the extent of affected areas and potential effects. Data on population sizes and densities, local native diversity, and the changes in native diversity in the presence of alien species would be valuable information. Based on these results, the ecological impact of these species can be assessed and any control measures undertaken. Special concern should be given to places where introduced and rare native species co-occur.

Legislation

Swiss law prohibits the intentional planting of alien species in natural areas without permission (§23, Bundesgesetz über den Natur- und Heimatschutz). Exceptions are, however, gardens, parks, and institutions of agriculture and forestry. Thus, the current Swiss regulation does not prevent the planting of invasive species on federal and private grounds. It is a curious situation that in natural areas planting of alien species requires permission but the release of dispersal propagules from invasive species planted in gardens into natural areas falls beyond the responsibility of the planters. Here is need for legal regulation of species trade and of the use of invasive plant species in horticulture and landscape architecture. In Germany, there is currently an intensive discussion on how to regulate the intentional planting or release of alien organisms (Doyle et al. 1998, Fisahn and Winter 1999).

Increasing awareness

There is wide agreement on the necessity of making the public aware of the invasive species issue in order to reduce, for example, the use of invasive plants as ornamentals. It is also necessary to gain community support for any larger control or eradication programme undertaken. Experiences in California have shown that support by the public community can be a substantial part of a successful control program against invasive species.

The primary aim of increasing awareness should be to explain why some exotic species have an impact on natural ecological processes and the maintenance of diversity, and that methods must be found to reduce these impacts. People must be convinced that field-actions are necessary, even if they have the connotation of "destroying" vegetation, and that invasive plants should no longer be used in horticulture or landscape architecture. For example, the two goldenrods *Solidago altissima* and *S. gigantea*, although threatening native species in many places, still are esteemed and widely used garden plants, and are commercially available through the plant trade.

Prevention of future plant invasions

The cheapest and safest control measure against invasive species is the prevention of their establishment (Zamora et al. 1989, Clout and Lowe 1997). Prevention requires the recognition of potentially invasive species among newly established species or species that are to be introduced. Several attempts have been made to predict invasiveness in plants based on ecological characters (reviewed in Ruesink et al. 1995), however, with various success (Williamson 1996). The best predictors proved to be information on the invasive behaviour of the species in other regions of the world, and whether or not the species has weedy congeners. This was taken into account by Reichard and Hamilton (1997) for the formulation of a risk assessment procedure to predict invasiveness in woody ornamentals for the U.S.

It is clear that the potential for new plant invasions is given as more and more aliens are becoming naturalized. Also, the alien floras of European countries contain many species that are invasive in other regions of the world (Weber 1997). New plant invasions can originate mainly from three sources: 1) by the onset of spread of already established exotic species that have currently a low abundance. As Kowarik (1995) points out, alien species that at present are not very abundant and widespread might become so in future due to the presence of lag-phases. 2) By natural immigration of exotic species from other countries. This includes dispersal and range expansion, and may be facilitated by changes in land use. 3) By intentional or accidental introductions of new species from other countries and continents and subsequent spread.

Prevention of new plant invasions requires several steps (Westbrooks 1991, Zamora et al. 1989) 1) Identification of foreign species that could cause problems, 2) Early detection of infestations if the species is already established, 3) Assessing the invader's noxious potential, and 4) Taking the necessary measures to control or eradicate new weed species.

In Switzerland, several species show a tendency of increased abundance during the last years (Table 5). Most of these were reported as weeds in other regions of the world. Although this refers mainly to cultivated areas, it shows that the species have a weedy character, e.g., they are able to colonize disturbed sites and can probably tolerate a wide range of environmental conditions. These explanations suggest to monitor the increasing species given in Table 5 by field surveys and to evaluate their invasion potential.

Table 5. Exotic plant species that are increasing their distribution in Switzerland, and their weediness in other regions of the world. Reports on weediness were taken from Anonymous (1992).

Species	Lifeform	Origin	Reported as a weed in
Artemisia biennis	Biennial herb	Eurasia	North America
Bidens frondosa	Annual herb	North America	South and North America, Asia, Europe
Crepis nemauensis	Annual herb	Eastmediterran	–
*Epilobium adenocaulon**	Perennial herb	North America	North America, Europe
Helianthus rigidus	Perennial herb	North America	North America
Impatiens balfourii	Annual herb	Himalaya	–
Meconopsis cambrica	Perennial herb	Western Europe	–
Muhlenbergia schreberi	Perennial grass	North America	North America, Asia
Oenothera parviflora	Perennial herb	North America	North America, Asia, Europe
Panicum dichotomiflorum	Annual grass	North America	South and North America, South Europe
Phytolacca esculenta	Shrub	Asia	Asia
Senecio inaequidens	Biennial herb	South Africa	Africa, Southwest Europe
Sisyrinchium montanum	Perennial herb	North America	North America, Europe

* Syn.: *E. ciliatum*

Zusammenfassung

Die ständig zunehmende Anzahl verwilderter Fremdpflanzen mit negativen Auswirkungen (invasive Arten) wird als ein wichtiger Bestandteil des "global change" betrachtet und ist ein aktuelles Thema ökologischer Forschung. In den meisten Regionen der Erde nimmt die Anzahl Fremdarten zu, eine Folge von weltweitem Handel und Tourismus sowie der Zerstörung natürlicher Lebensräume. Mehrere internationale Organisationen beschäftigen sich mit invasiven Arten und geben Richtlinien und Empfehlungen für den Umgang mit solchen Arten heraus. In der Schweiz spielen invasive Pflanzenarten eine geringere Rolle als in vielen anderen Regionen der Erde. Dennoch werden gewisse Arten als problematisch für den Naturschutz betrachtet. Deren Bedeutung liegt in der intensiv genutzten und stark fragmentierten Landschaft, wo einheimische Vegetation mit großem Artenreichtum oft auf kleine Flächen beschränkt ist. Hier können invasive Arten zusätzliche Probleme verursachen durch Verkleinerung von Habitaten und Konkurrenz in den Habitaten für einheimische Arten. Invasive Pflanzenarten in der Schweiz sind zum Beispiel *Robinia pseudoacacia, Solidago altissima, S. gigantea* aus Nordamerika, sowie *Impatiens glandulifera* und *Reynoutria japonica* aus Asien. In diesem Artikel wird das Problem der invasiven Pflanzen erläutert und mögliche Ansätze zu deren Kontrolle werden diskutiert.

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