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Introduction and invasion of dendrotaxa in Arboretum Mlynany SAS

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Abstract: Invasions of allochthonous dendrotaxa endanger natural biological diversity, stands and natural ecosystems. Their effect is destructive from the viewpoint of ecology as well as economy as the new required managements of recording and liquidation are economically demanding. Problems with foreign dragged in species invading into natural as well as cultural ecosystems are mentioned in the Treaty on Biodiversity joined by most countries in the world. It is practically impossible to prevent introduction as the purpose-modified introduction is and will be for experimental and theoretical work a part of genetic resources and of their utilization in breeding practice. Arboreta and botanical gardens as centres of introduction will always be potential sources of invasive species and therefore are adequate measures for their elimination always topical. One of the possible forms of restriction of the spread of invasive dendrotaxa in arboreta and botanical gardens is more intensive special maintenance and new ways of the arrangement of dendroexpositions.

Keywords: allochthonous taxa, introduction, invasion, dendroexposition.

Introduction

At present represent 2350 taxa, mostly of allochthonous dendrotaxa, the gene pool of Arboretum Mlynany. More than 110 years of their existence in conditions of arboretum show different degrees of adaptation and also acclimatization in the conditions of new cultural community. Auto-reproduction of many taxa documents not only their full adaptation but it is also the reason of invasive

behaviour. Negative influence of anthropogenic activity on the composition of natural phytocenoses impoverishes biodiversity and many taxa become endangered. Spread of non-allochthonous species (invasions) results in changes of natural composition of phytocenoses. Introduction, if it shall not be the cause of invasion, is a process that is necessary to be regulated and its aims are to be controlled. One of the ways is the study of adaptability and naturalization of introduced woody plants and of the introduction process.

Material and methods

At the beginning was the introduction of woody plants into Arboretum Mlynany oriented mainly to evergreen taxa. There are concrete data about many transfers, and the process of introduction was recorded as far as adaptation of woody plants is concerned. Programme of introduction was extended later on, and at present it is a principle of climatic-geographical organization of individual dendro-expositions to save the original evergreen character. A new content is the creation of a rosary to present all groups of roses inclusive of the botanical ones. Protection of endangered dendrotaxa and preservation of cultural biodiversity are reflected also in structures and compositions of individual dendro-expositions. More intensive introduction is accompanied by a new phenomenon – invasion of allochthonous woody plants that enlarged markedly their area and they penetrated into new localities. We keep their records to preserve the biodiversity, and to elaborate special management of maintenance of gene pool collections in arboretum.

Results

Recently is paid more and more attention to invasions of allochthonous species of organisms into natural communities in most countries in the world because they endanger biological diversity of natural ecosystems and they make the management of other ecosystems difficult (ELIAŠ, 1999). The Treaty on biological diversity appoints the signatories of the treaty to prevent non-controlled introduction, to control or destroy those dragged in species that endanger the ecosystems, sites or species. The introduced invading foreign species are today considered the most serious menace to biological diversity. Management and level of specialist maintenance of cultural vegetation are one of many factors of restriction of spread of foreign woody plants within the invasion from arboreta and botanical gardens. One of the ways of spread of invasive species is omitted maintenance or little intensive or unprofessional maintenance of cultural stands in historical parks, botanical gardens and arboreta. Ways of spread of invasive species are often identical with ways of transfers of genetic resources of new taxa into botanical gardens and arboreta.

Total number of invasive woody plant species characterized as local invasive species in Arboretum Mlynany represent 40 taxa out of which many broke outside the area of the arboretum. The elaborated management of professional maintenance of the gene pool assumes intensification of the maintenance. It means in practical terms:

To increase the number of cuts of grass areas

To remove natural seedings from park coenoses

To repeated the removal of invasive woody plants

To reconstruct grass stands and flower-beds

To reconstruct and change the park coenoses to be resistant and aesthetically interesting cultural phytocoenoses

To isolate invasive taxa and make quarantine planting of invasive taxa

To organize dendrotaxa presentation in the composition and structure of natural communities in situ

Not always can be the origin of invasive species and time when they appeared precisely determined. They break into the territory of the state (TERPÓ, 1997) spontaneously – by unknown activity of man, or for growing purpose. In the arboreta and botanical gardens they represent a part of the introduction process with various ways of transfer. These are organized processes and therefore records on potential invasive species are topical and real at the beginning of their growing already. Management of record keeping on them shall contain also the ways of their maintenance on acceptable level according to localities and number of individuals.

Tab. 1. List of invasive dendrotaxa in Arboretum Mlynany SAS

Name of taxon	Origin	Occurrence – locality
Ailanthus altissima *(MILL.) SWINGLE*	China, Korea	*9*
Broussonetia papyrifera (L.) L'HÉR	East Asia	3
Fallopia sachalinensis HOUTT.	East Asia	5
Fallopia japonica (HOUTT.) ROSE DECR.	Japan	9
Lycium chinense MILL.	China	2
Negundo aceroides MOENCH.	North America	15
Padus serotina EHRH.	North America	5
Populus x *canadensis* MOENCH.	North America	5
Robinia pseudoacacia L.	North America	25
Paulownia tomentosa (THUNB.) STEUD.	East Asia	3
Fraxinus americana L.	North America	12
Fraxinus pennsylvanica MARSH.	North America	15
Parthenocissus quinquefolia (L.) PLANCH.		
Prunus divaricata Led.	The Caucasus, Iran	2
Amygdalus communis L.	Central Asia	1
Corylus colurna L.	Balkan, the Caucasus	3
Cotoneaster divaricatus REHD. ex WILS.	China	3
Cotoneaster horizontalis DECNE.	China	3
Koelreuteria paniculata LAXM.	China	3
Prunus cerasifera EHRH.	Mediterranean	7
Biota orientalis (L.) ENDL.	East Asia	5
Elaeagnus angustifolia L.	Eurasia	4
Juglans regia L.	The Caucasus, Asia Minor	4
Pyracantha coccinea ROEM.	Mediterranean	*6*
Syringa vulgaris L.	Balkan, Asia Minor	8
Catalpa bignonioides WALT.	North America	5
Diospyros lotus L.	Asia	5

Persica vulgaris MILL.	China	1
Buxus sempervirens L.	Mediterranean	9
Laurocerasus officinalis ROEM.	The Caucasus, Asia Minor	9
Ilex aquifolium L.	South Europe	7
Symphoricarpos albus (L.) S.F. BLAKE	North America	9
Spiraea tomentosa L.	North America	1
Sorbaria sorbifolia (L.) A. Br.	North of East Asia	3
Lonicera maackii (Rupr.) MAXIM.	Korea	7
Viburnum rhytidophyllum HEMSL.	China	7
Rhus typhina L.	North America	6
Rhus radicans L.	North America	3
Rosa rugosa THUNB.	East Asia	4

Conclusion

Arboretum Mlynany SAS represents a specific workplace for the research of woody plants biology. Introduction of woody plants inclusive their naturalization results in some cases in invasive behaviour, qualified as local in the given case, in the conditions of the area of arboretum, or in its close neighbourhood (forest stand – Viešťansky háj). At present are in arboretum concentrated 2350 dendrotaxa in the area of 67 ha, 40 taxa out of them are invading.

In the last few years we record in Slovakia the spread of allochthonous species from the collections of botanical gardens and arboreta. Some aggressive taxa occupy vacated places in natural and cultural communities as they spread. If we take biological invasions for spontaneous spread of allochthonous (dragged in, introduced) species of organisms in new areas and their (collective) penetration into the composition of native or domesticated communities (ELIAŠ, 1993) it is a result of introduction process in new conditions.

Invasive species were identified as a serious global thread menace to biological diversity; they affect natural and production systems and therefore are their reduction or liquidation topical. It is necessary to aim the management of maintenance of cultural vegetation, as well as stands in arboreta, at their regulation and gradual liquidation if need be. Specialist and intensive maintenance bring results also in this case.

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