In-Tree policy brief

“A forest pest is not always a forest pest”

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With support from

Federal Ministry
of Food
and Agriculture

by decision of the
German Bundestag

IMPRINT:

The authors would like to thank Franz Essl and Georg Winkel for their comments and collaboration in compiling this brief.

This brief is based on the project carried out in 2015–2016 titled

IN – TREE – Introduced tree species in European forests: opportunities and challenges. It presents policy recommendations that are based on the findings of the final report of the project, published in 2016.

Reference to the full report:

Krumm, F. and Vitkova, L. (editors) 2016. Introduced tree species in European forests: opportunities and challenges. European Forest Institute. 423 pp.

European Forest Institute, 2016.

http://in-tree.org/uploads/images/book/Introduced_tree_species_E-1.pdf

Layout: rombach digitale manufaktur, Freiburg

Printing: rombach digitale manufaktur, Freiburg

Photo credits: L. Vitková (Front right and rear; mixed mountain forest in southern Germany including Douglas fir), F. Krumm (Front).

Introduced tree species – in retrospect

The introduction of tree species has a long history. Long before any human influence, species migrated due to climatic changes, natural disturbances, and evolutionary processes. This is well proven by historical palaeobotanical research using macrofossils and pollen diagrams. Human impacts on forest ecosystems increased along with population and as human activities became more diverse. The earliest deliberate introductions of tree species beyond their natural ranges were driven mainly by the need to ensure reliable food supply, and dates back as far as the Mesolithic age (10 000 to 5 000 BC). Tree species introduction and increased intensity of land use, have thus contributed to the alteration of forest composition and forest landscapes in Europe.

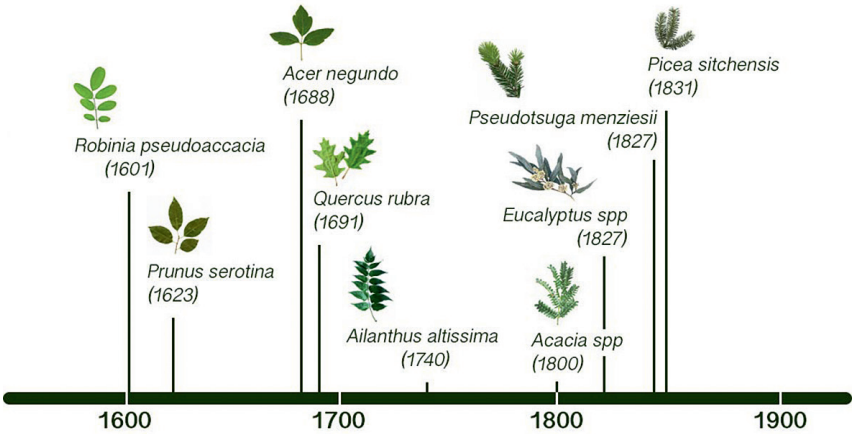


Figure 1: Time line of introductions of some of the important non-native tree species introduced to Europe.

The discovery of the 'New World' and the consequent colonial era are generally thought of as the onset of greater introduction efforts in modern history. Tree species introduced from the 'New World' were, at first, often the result of human curiosity and planted for ornamental and aesthetic reasons. Large areas of forest had been depleted due to growing wood demands for ship building and to support the industrial revolution in Europe. There was a recognition of the need to restore forests in certain countries, especially England, France and Germany. Large scale reforestation measures during the 19th and 20th century led to increased use of introduced tree species. Since this time, they have become

an integral part of modern plantation forestry. In addition to their often superior growth rates over native tree species, the resistance against pests, drought and other climate change driven impacts made them indispensable in forest plantations. Consequently, an estimated 25 % of the global forest plantations are comprised of introduced tree species. Today there is a need for adapting forest ecosystems to rapidly changing environmental conditions. This has sparked a passionate discussion on what role introduced tree species play in meeting and coping with these environmental challenges, and what trade-offs there might be with regard to risks and consequences of invasiveness. As has been proven, use of introduced species can lead to biological invasion and as a consequence constitute a major driving force for decreasing biodiversity. Once they have become invasive, they may not only negatively affect forest ecosystems but also cause substantial economic loss.

The existence of both risks and benefits associated with introduced species, including trees, generates different and often conflicting views about their use.

Reservations against introduced species - perception matters

Therefore, in addition to fact-based knowledge, the perception of introduced trees matters. In the face of an existing or assumed risk of invasion, individuals or societal groups will mostly argue towards preferring native over introduced species, as they are well integrated into native ecosystems. Thus policy development will also generally target prevention or mitigation of the invasion risk. Assessing invasion risks, however, again may be influenced by different perspectives and underlying societal values.

Since the environmental movements in the 1970s, concerned citizens and scientists have sought to re-orient modern life-styles towards more sustainable ways of living. From some perspectives there is a moral limit to human dominion over nature. What is it that makes introduced species problematic for nature and nature conservation? (1) introduced species may be (perceived as) strangers that do not belong to a given landscape; (2) introduced species are, by definition, proof of human activity; and (3) invasive introduced species may represent qualities of nature that are not valued in the ideal of nature conservation. The vitality, vigour and, often massive spread and mass occurrence may contribute to passionate arguments for the eradication of introduced species, and against their continued use. On the other hand, those with an economic stake in the maintenance of an introduced species as part of the landscape (e.g. fo-

rest owners harvesting black cherry, bee keepers who benefit from the presence of black locust), will argue that introduced species play an important role. Consequently, they will lobby policy makers to promote the benefits of introduced species.

Figure 2: Young Sitka spruce forest plantation in Ireland (photo: L. Vítková).

Well informed decision making

Therefore, science has the role of a non-biased and neutral platform for providing evidence-based knowledge and information for decision making in view of diverging perceptions. Since the late 1990s this is reflected through a considerable increase in the number of published papers and reports addressing introduced species and scientific questions around invasiveness. Furthermore the occurrences of species invasions have been more extensively documented within Europe and worldwide. This has resulted in the compilation of experiences and know-how generated also at practical and management level, often in the form of case studies.

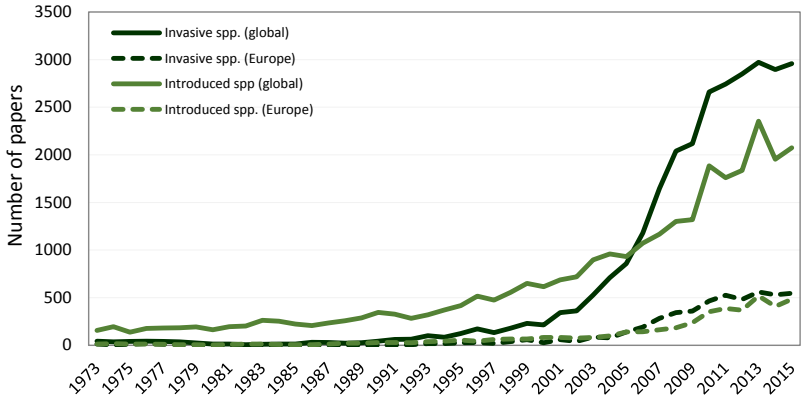


Figure 3: The number of scientific papers on introduced and invasive tree species published since 1973 on both European and global (incl. European papers) level is shown.

Some facts and figures - Europe

At present there are estimated to be more than 12 000 introduced plants, animals, fungi and micro-organisms in the European Union and in other European countries. Out of those 10 % to 15 % are considered to be invasive with their numbers increasing. By either suppressing or eliminating indigenous species, invasive alien species are considered one major contributor to biodiversity loss. It is estimated that they have cost the European economy €12 billion per year over the last 20 years. They also affect a wide range of ecosystem services, infrastructures and can have serious implications for human health. In forest ecosystems, 134 woody plant species (71 trees, 61 shrubs and 2 defined tree/shrub) are regarded as invasive in Europe.

Political frameworks

Invasive alien species rank high in international policy frameworks for nature conservation, including the 'Convention on Biological Diversity'. They are given attention by 'Forest Europe' within its Resolutions while one of the pan - European indicators for sustainable forest management is designated to collecting information and monitoring changes on the occurrence of introduced tree species. Within the European Union the EU Biodiversity Strategy 2020 has a dedicated target of preventing the introduction and establishment of invasive alien species.

In 2014 an EU Regulation was adopted and specifically addresses 'the prevention and management of the introduction and spread of invasive alien species'. The Regulation places emphasis on the consequences resulting from invasive alien species and how to deal with those in a holistic and comprehensive manner. It seeks to protect native biodiversity and ecosystem services, while minimising and mitigating the impacts such species may have on human health and economy. The Regulation addresses only species of overall EU concern and does not include species which may be invasive at the regional or national levels. Under this Regulation the European Commission and EU Member States have the possibility to propose additions to the list of invasive alien species of Union concern. Those are evaluated based on a set of criteria. A scientific forum reviews the scientific robustness of the provided information while a designated committee ensures compliance with the criteria. The list is regularly updated by either adding new species or removing species that no longer meet the criteria for inclusion. A first invasive alien species list entered into force in August 2016.

There are also many databases in place on invasive alien species at national, regional, European and global level. One of these is the European Information System on Invasive Alien Species (EASIN) and is hosted by the Joint Research Centre of the European Commission.

Key aspects of introduced and invasive species and management consequences

A number of factors that affect introduced and invasive tree species need to be considered when discussing their management. Economic aspects are certainly key to the discussion as costs for control and eradication can potentially become very high and success is not guaranteed. On the other hand, introduced tree species are actually very often planted with the aim to generate economic return due to higher yields, timber qualities or other specific characteristics.

Two of the main drivers for ecosystem alteration in recent times are climatic and land-use changes. In some parts of Europe, the introduction of new species may be regarded as an opportunity to compensate for economic losses resulting from effects of climate change. In some regions of Europe, the forest-based industries dependent on certain productive native species – such as Norway spruce and Scots pine, which in recent years have been particularly affected by climate change – may require alternative species – such as Douglas fir.

The pathogens of introduced tree species and the interaction between introduced tree species and arthropod communities are often important co-factors that can make the difference between an introduced species becoming an invasive forest pest or not. This can be interlinked with natural disturbances and further reinforced as the frequency and extent across the European continent are changing. Examples from European countries and other parts of the world, show that post-disturbance dynamics are often dominated by introduced species that may become invasive and then have the potential to alter an ecosystem. As an example, natural fire regimes may be altered by species invasion which in consequence can alter the inherent biodiversity of a forest ecosystem.

Recommendations

Based on cross-disciplinary reviews of scientific literature, case study examples and experiences from management practices – both from Europe and from across the globe– the following points should be taken into consideration when addressing or discussing introduced tree species.

- **Historical context –** the natural history prior to human influence as well as the effects of human intervention need to be well understood; species migration is a natural process and a precondition for adaptive capacities of ecosystems. Changes in the distribution of silver fir, for instance, shows the adaptive capacity of a species, and that influencing co-factors, such as the presence or absences of browsers (e.g. deer) and predators of those browsers (e.g. wolves) can have considerable impacts on the resilience of an ecosystem. Attributing observed changes to single factors, and the presence or absence of single species may often provide a misleading picture.

- **Climatic change –** is driving alterations to forest ecosystems. Furthermore, the frequency and severity of disturbance events has increased which can have an (often unpredictable) influence on the species dynamics. This is an important (and largely unforeseeable) factor, interacting with others. Accepting change may be a way to cope with such situations. This is especially the case if: the overall consequences of species invasion are too uncertain; a species invasion may be too difficult to prevent; the prediction of the spread of a species is unclear; or the costs for management or control are too high. The decision not to act, however, goes against the human instinct to manage and shape landscapes to ensure food supply, security and cultural values. It may thus be regarded as an unacceptable risk to allow 'uncontrolled' developments with an unknown outcome.

- **Invasiveness –** when species become invasive it should be taken seriously and management plans developed and applied. A proper distinction between introduced species and invasive species should be the basis of every discussion.
- **Terminology –** commonly agreed terminology should set the baseline of any political discussion and corresponding actions.
- **Framework –** policy must provide guidance and frameworks at different scales that allow the specific circumstances (climatic conditions, environmental conditions, land management objectives) to be distinguished.
- **Economy –** Use of introduced tree species should be an option for forest managers. All ecosystem goods and services and the perspectives of all relevant stakeholders should be taken into account when looking at the issue of introduced species from an economic point of view. Decisions to control and manage the distribution of introduced tree species – or perhaps even to eradicate it – can incur very high costs. Such decisions have to be very carefully evaluated and have to take into account all involved stakeholder groups and the potential benefits that the different stakeholders actually have or expect from these species.

Figure 4: New forest type along a street in southern Switzerland including paulownia, ailanthus, different acacia species and pokeberry (photo: F. Krumm)

- **Inter-generational** communication needs to be addressed. It is important to ensure that our children know the value of our forests as they are an inseparable part of the environment we live in. A wide range of environmental issues should be addressed already in schools. These should include the topic of introduced species and the potential of invasion, why invasion may occur and once established how such species may shape and alter our environment. As part of the In-Tree project, numerous workshops and activities were conducted on the topic of introduced tree species including for example an educational event for children of various ages (10–17).

"Introduced species can cause serious problems in ecosystems. Raising awareness about the issue already in school can help to alleviate the problem. Ecology is part of the German school curriculum, and in this context it is a relevant topic that leaves room for critical ethical debate, which is a good tool to help students form their own opinion. Combining the scientific view with a more effective artistic approach as a teaching tool helps visualise the problems related to invasive species. At our school, students created very different outputs after a short introductory presentation, which shows that a creative process is stimulated by this topic that works with students of all ages."

Annette Schuck, Vice Principal at Montessori Zentrum Angell Freiburg, Germany

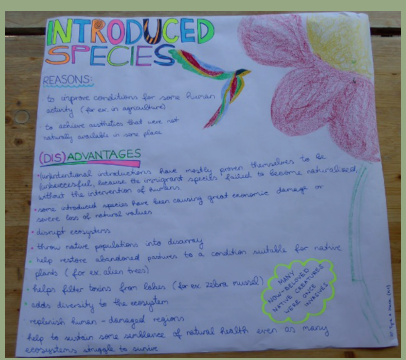
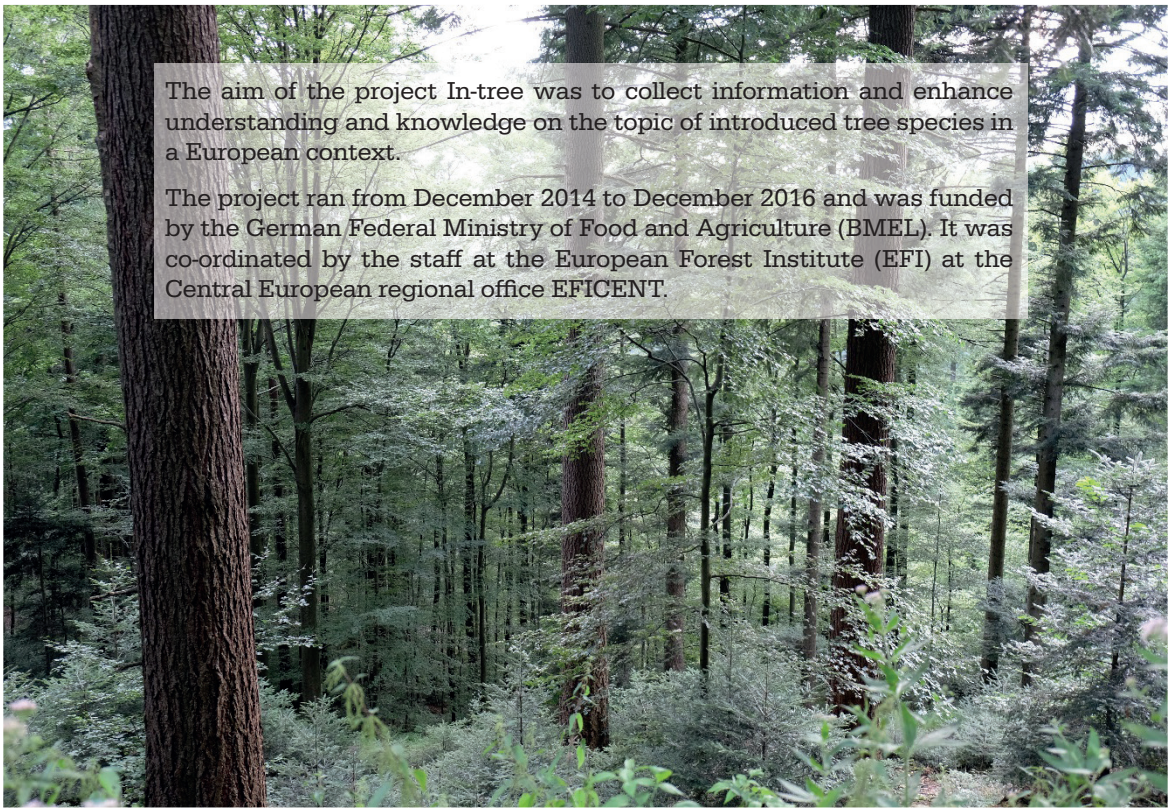


Figure 5: School children of different ages learning about introduced species expressed in composing a song (left) and summarising group work (right) (photos: L. Vítková).

- **International collaboration** and joint multidisciplinary projects resulting in suitable risk assessments are a way to address potential threats and to analyse the impacts of already established introduced and invasive species.

- **Cross-sectoral coordination** – Many sectors (e.g. forestry, agriculture, horticulture and landscape management) as well as the broader society are affected by tree species introductions and, in the worst case, invasions. Adaptive management approaches are needed that allow reasonable reactions suited to local conditions.

  National administrations should also enhance and allow for communication across sectors. Certain approaches may be applied in one sector, but if stakeholders in other sectors (e.g. landscape planners, infrastructure planners and horticulturists) do not apply these measures, the impact will be much less effective than they could have been. There are many examples of non-native species that have escaped from parks and gardens, and that became a problem for surrounding forests and corresponding forest functions. This is an issue for forest owners and managers and can increase forest management costs dramatically.



The aim of the project In-tree was to collect information and enhance understanding and knowledge on the topic of introduced tree species in a European context.

The project ran from December 2014 to December 2016 and was funded by the German Federal Ministry of Food and Agriculture (BMEL). It was co-ordinated by the staff at the European Forest Institute (EFI) at the Central European regional office EFICENT.