A Field Guide to Invasive Alien Species in European Forests

LIFE ARTEMIS

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EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

A Field Guide to Invasive Alien Species in European Forests

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Foreword

We often perceive forests as stable ecosystems. Individual trees may be felled by storms, but then young ones take their place and the forest as a whole appears to remain the same. This, however, is no longer the case. Several emergent diseases and insects of alien origin are causing a massive dieback of trees, leading to irreversible changes in species composition. Ornamental plants from urban areas are spreading to forests where some cover the forest floor, outcompeting native plants. Sometimes these stands are so dense that young native trees cannot germinate successfully, disrupting the natural rejuvenation of forests. Even some alien tree species, which have been deliberately planted in European forests, are spreading beyond their original settings, influencing species diversity and altering ecosystem processes.

In the past, efforts to manage and mitigate the impacts of invasive alien species were mostly directed at those species which were already established and spreading. However, eradication of these species, especially from complex forest ecosystems, is often not feasible. Measures to prevent introductions as well as early warning and rapid response measures which prevent the establishment and spread of alien species are crucial for their effective management. In Europe, there are several initiatives to establish efficient early warning and rapid response (EWRR) systems directed at these organisms. These include the **project LIFE ARTEMIS** (*Awareness Raising, Training and Measures on Invasive alien Species in forests*), within the framework of which we prepared the initial version of this field guide in the Slovenian language.

The field guide was developed as a tool for detecting and recognising alien species in forests. It is intended for professionals and citizen scientists and therefore we have tried to make identification as straightforward as possible, by providing key characters and directly comparing species to the other alien and/or native European species that are most similar. The initial set of alien species presented in the guide were those placed on the Slovenian alert list of potentially invasive alien species in forests. We have also included some of the widespread alien species which are more conspicuous and often the first to be noticed by professionals and citizen scientists.

We are excited to have been provided with the opportunity to translate this guide into English and adapt it for a wider European audience. With the help of the colleagues from several European countries, several more species which appear relevant in the wider European context have been added to the English language edition.

Professionals are often in the field with their eyes and ears open for possible invasive species. This said, the first individuals of alien species are often inconspicuous, and the chances of their detection are very low. Here is where volunteers involved in citizen science come into play, as they often visit areas which are not covered by the official monitoring schemes. In many cases, non-professionals have been the first to spot alien species, enabling rapid and successful eradication. Modern technologies further facilitate the involvement of the public in reporting these sightings. In most European countries, platforms and mobile applications have been developed to assist the reporting of alien species but the next challenge is to train volunteers to be able to reliably identify species in the field.

We hope this guide will prove a useful companion to anyone attempting to identify alien species in European forests.

Editors, September 2019

Acknowledgments

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We would like to thank the *COST action Alien CSI, Increasing understanding of alien species through citizen science (COST Action CA17122)* and especially Dr. Helen E. Roy for providing us with the opportunity to translate this field guide into English. We are grateful to Bernat Claramunt, Katrin Schneider, Wojciech Solarz, Giuseppe Brundu, Markus Seppälä, Jiří Skuhrovec, Quentin Groom, Ioannis Giovos, Michelle Cleary, Esra Per and Toril L. Moen who assisted in compiling the list of citizen science initiatives in the framework of the COST action Alien CSI.

The maps in this guide are based on several European data sources and we are especially grateful to the experts from the European Alien Species Information Network - EASIN who provided us with the full dataset of the records of the alien species which are included in this guide.

During the creation of this field guide, either directly or through various online photo collections, we were provided with pictures of alien species. We would like to thank the photographers from all over the world who generously provided their work.

Paul Tout had an invaluable role in preparing the English version of this guide. Not only did he proofread the texts and made them sound much more "English", but as an experienced biologist, he also provided useful remarks on the species descriptions and pointed out the doubtful "political correctness" of some of the older English common names we had chosen to use and provided alternatives!

Contents

Introduction

Authors: Jana Kus Veenvliet, Maarten de Groot, Andreja Kavčič, Aleksander Marinšek, Nikica Ogris, Dušan Jurc, Tim Adriaens, Rachel Farrow, Elena Tricarico

Invasive alien species

The movement of animals and plants goes far back into the history of humankind. For centuries, we have transported useful species between countries and continents, which, as a result of their origin, are called **alien species**. Many of these species are still important food resources. However, during recent decades we have become increasingly aware of a downside to the movement of species. Some alien species have managed to establish themselves in natural environments and thrive without any human assistance. Having no natural enemies and diseases, they are able to spread and cause damage to the environment and to the economy. These species are termed **invasive alien species**.

For many years, invasive alien species did not receive much attention. Data on their distribution were not systematically collected and they were recorded more or less sporadically as interesting findings. In many countries the spread of invasive alien species continued unnoticed and no measures were taken to prevent their spread.

However, in recent years our attitude towards alien species has evolved rapidly. We have become aware of their presence and of their impacts on the environment and the economy (figure 1). At the same time, it has become clear that, for the effective management of alien species, we should pay more attention on preventing their arrival and spread. Various legal instruments are now in place to prevent introductions, for example a ban on the import and possession of some invasive alien species. There is also complex plant and animal health legislation, imposing checks of consignments at borders with the aim of preventing the unintentional introduction of alien species with goods. There are a growing number of awareness-rasing campaigns on invasive alien species. A variety of target groups is being informed of the negative environmental impacts of invasive alien species and are encouraged to handle them responsibly in order to prevent their spread into the environment.

Unfortunately, data show that the preventive measures are insufficient and the number of alien species continues to grow. Within Europe alone, they annually cause several billions of euros of costs. Massive levels of international trade remain a continuous source of new introductions.

Once alien species are established and start spreading, eradication is often not feasible. To mitigate their impacts, an **early warning and rapid response (EWRR)** system should be set in place. This increases the likelihood that new alien species are detected at the early stages of invasion and that measures can be taken to prevent that these species form permanent or expanding populations, which may cause damage.

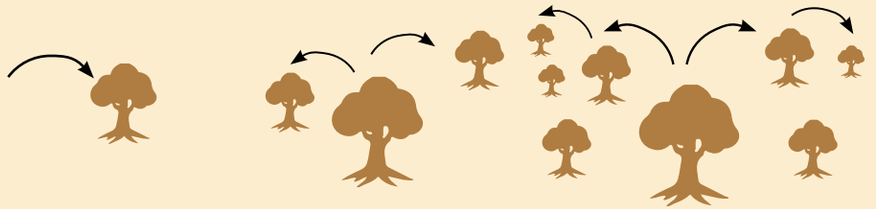
KEY TERMS

Alien species: any living organism which has been deliberately or unintentionally introduced to an area outside of its native range which it could not reach without the help of humans.

Invasive alien species: an alien species that threatens ecosystems, habitats and species. Many also have negative impacts on the economy and human health.

Native species: a species living within its (past or current) native range, even if it is present there only sporadically.

THE INVASION PROCESS - FROM INTRODUCTION TO INVASIVENESS



Phase 1: an introduction of a new species which is deliberately or unintentionally introduced to an area outside of its native range.

Phase 2: the species is established in the new environment, it is reproducing and forming permanent populations - it is **established**.

Phase 3: the species is spreading quickly and causing damage to native species and ecosystems, sometimes also to the economy - the species is **invasive**.

Figure 1. Invasive alien species have various impacts on forests: **a)** tree-of-heaven (*Ailanthus altissima*) overgrows forest margins, **b)** the fungal disease ash dieback (*Hymenoscyphus fraxineus*) causes dieback of ash trees, **c)** Asian longhorn beetle (*Anoplophora glabripennis*) bores tunnels in wood, **d)** bark stripped by grey squirrel (*Sciurus carolinensis*).

Early warning and rapid response

An "early warning and rapid response" (EWRR) system consists of several activities:

1. Early warning can include active searching for new alien species. This is challenging, because it may not be possible to predict which new species appear, and where. In initial stages, there are sometimes only few individuals present. This makes them difficult to detect. It is therefore imperative to set priorities. We should pay extra attention to invasive species which are already spreading and which are likely to increase their distribution. Species such as these may be placed on alert lists.

In the framework of the LIFE ARTEMIS project, we compiled an alert list for alien species in forests, which also served as a basis for this guide. For this English edition, we have added several species which are relevant for European temperate forests. Because this guide is meant as a tool for early detection, many widespread invasive alien species are not included.

Priority areas to search for invasive alien species may be places where invasive alien species are likely to appear (see the box on the right), areas with suitable conditions for certain species, and protected areas where we aim to safeguard biodiversity. These activities may be carried out by experts carrying out phytosanitary measures, or who are in charge of biodiversity monitoring and forest management.

In addition to this, for effective EWRR it is very important to have a broad network of observers, who can provide random observations from a wide area. Anyone interested can keep an eye on their surroundings and learn to recognise alien species. With the rise of new technologies, it is now easy to report data over mobile applications. This has given rise to many citizen-science initiatives. For an overview see pages 6–8.

TIPS ON EARLY DETECTION

Alien species can appear anywhere, but because of their pathways and ecological characteristics, we should especially pay attention:

- in areas, where primary vegetation has been removed and soil is partially exposed (industrial areas, construction sites, field margins);
- in forest clearings, especially where the soil has been damaged by forestry machinery;
- along roadsides and railroad embankments;
- in the surroundings of airports and harbours;
- in the vicinity of tree nurseries, botanical gardens, cemeteries and in city parks,
- on wasteland, disused quarries and in their surroundings,
- along rivers and streams, especially where banks are not entirely vegetated.

We may suspect that an observed species is alien to an area when we:

- suddenly see large numbers (clumps of plants, groups of animals) that we did not notice before,
- find a species in the garden which we did not plant;
- see a plant in nature, which we know as an ornamental plant and is not native to the country;
- notice the dieback of trees (dying of leaves, necrosis, dieback of branches, cracks on the trunk and branches, thickened calluses on bark); one tree species or several may be affected;
- observe mammals (especially squirrels) which are tame and do not run away.

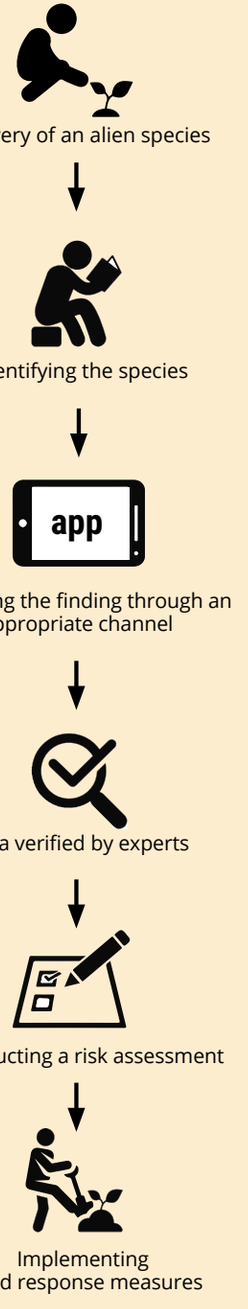
2. Identification of alien species is sometimes not straightforward because they may be new and unknown to the observer. They are often not described in local identification guides. This field guide was developed to specifically enable identification of alien species. These are compared with the most similar other alien and/or native species.

3. Reporting of data: EWRR systems should enable fast and efficient reporting of data which are then collected in a central system. This is usually done via web and mobile based applications. In some of these applications, data are verified by experts. This greatly improves the reliability of data.

4. Risk assessment: After the discovery of a new alien species, experts should perform a risk assessment, based on the available scientific literature and consultation with experts from other countries. In this process, it is assessed how likely a species is to become invasive in an area and which negative impacts it may have.

5. Rapid response: When a species is discovered in the early stages of invasion and the results of the risk assessment provide evidence that the species poses serious threat to the environment or the economy, eradication measures are set out. If the species is already established and eradication is no longer feasible, measures to control the species and prevent further spread should be determined. When determining these measures, it is important that they are accepted by the public, and are ethical and economically and politically acceptable. This requires efficient communication with landowners and key target groups as well as informing the public.

A DIAGRAM OF THE EARLY WARNING AND RAPID RESPONSE SYSTEM



SELECTED TOOLS FOR RECORDING ALIEN SPECIES

In recent years, many projects have emerged in Europe which use a citizen science approach towards collecting data on invasive alien species (IAS). Many online portals and smartphone applications now exist to report observations, at different geographical scales and with various taxonomic scopes. Observers have to carefully choose the tools they use to submit records, in order to maximize usefulness of their data for invasion research or management.

The list below presents a selection of citizen science portals, mobile applications and projects related to the invasive species and forest pests mentioned in this field guide. This selection only refers to live systems which allow the submission of records. The list was compiled by the AlienCSI COST action, see: https://alien-csi.eu/ As this overview is probably not exhaustive, additional relevant recording portals can be reported to alienCSIWG1@gmail.com.

INTERNATIONAL
iNaturalist: *www.inaturalist.org* (all species)
e-Bird: *www.ebird.org* (all bird species)
Observation.org: *observation.org* (all species)

EUROPE
Invasive alien species Europe: *https://easin.jrc.ec.europa.eu/easin/NewsAndEvents/DetailNews/391a026f-d9f5-4fce-8789-2028ea73f86d* (species from the IAS Regulation)
iNaturalist – Invasive Alien Species of Union Concern: https://www.inaturalist.org/projects/invasive-alien-species-of-union-concern
WeObserve: *www.weobserve.eu* (all species, environmental monitoring)
Ornitho.eus: *www.ornitho.eus* (birds)
European Ladybirds: *european-ladybirds.brc.ac.uk* (invasive harlequin ladybird)

REGIONAL
DanubeForestHealth: *danubeforesthealth.eu* (Forest pests and pathogens; Countries: Austria, Croatia, Hungary, Serbia, Slovenia)

BELGIUM
Waarnemingen.be/exoten: *waarnemingen.be/invasive_alert_view.php* (a selection of (potential) IAS)
Vespawatch: *www.vespawatch.be* (Asian hornet)
That's Invasive: *www.rinse-europe.eu/resources/smartphone-apps/* (selection of IAS)
Portail Biodiversité Wallonie Espèces Invasives: *biodiversite.wallonie.be/fr/invasives.html?IDC=5632* (selection of IAS)
DEMNA OFFH: *observatoire.biodiversite.wallonie.be/encodage/* (all species)

CZECH REPUBLIC
Biolib.cz: *www.biolib.cz/en/speciesmappings* (all species)
Plant Medicine Portal: *eagri.cz/public/app/srs_pub/fytoportal/public/?k=0#rlp|met:domu|kap1:start|kap:start* (Monitoring of Pests including invasive species)

ESTONIA
Nature observations database (Loodusvaatluste andmebaas, LVA): *lva.keskkonnainfo.ee* (all species)

FINLAND
Finnish Biodiversity Information Facility: *laji.fi/en* (all species)
Finvasive LIFE-project: *laji.fi/vihko/MHL.53* (selection of IAS)
Natural Resources Institute Finland: *lomakkeet.luke.fi/vieraslaji* (invasive mammals)

FRANCE
Faune France: *www.faune-france.org* (all species)
EEE-EIF: *eee.mnhn.fr* (selection of IAS)
Les écureuils en France: *ecureuils.mnhn.fr/enquete-nationale* (alien squirrels)
INPN frelon asiatique: *frelonasiatique.mnhn.fr* (Asian hornet)
AGIIR: *ephytia.inra.fr/fr/P/128/Agiir* (pest insects)
Observatoire de la Coccinelle asiatique en France: *vinc.ternois.pagesperso-orange.fr/cote_nature/Harmonia_axyridis/* (harlequin ladybird)

GERMANY
KORINA: *www.korina.info* (alien plants)
Ambrosia Scout: *lfu.brandenburg.de/info/ambrosia_scout* (common ragweed)
Berliner Aktionsprogramm gegen Ambrosia: *ambrosia.met.fu-berlin.de/ambrosia/index.php* (common ragweed)
DDA Bird Monitoring: *www.ornitho.de* (birds)
Naturgucker: *www.naturgucker.de* (all species)
Artenfinder: *artenfinder.rlp.de* (all species)
Deutschlandflora: *deutschlandflora.de/dflor* (plants)
Flora Incognita: *floraincognita.com* (plants)

ICELAND
Reykjavik Bioblitz: *www.reykjavikbioblitz.is* (all species)

IRELAND
National Biodiversity Data Centre: *www.biodiversityireland.ie* (all species)
iSpot share nature: *www.ispotnature.org* (all species)
Report Invasive Plants in Limerick: *invasivespecies.limerick.ie* (selected invasive plants)

ITALY
LIFE STOPVESPA: *www.vespavelutina.eu/en-us/what-can-you-do/Report-your-observation* (Asian hornet)
LIFE EC-SQUARE: *www.rossoscoiattolo.eu/en/what-can-i-do-project* (alien squirrels)
Life U-Savereds: *usavereds.eu/it_IT/cosa-puoi-fare-per-il-progetto/* (native and alien squirrels)
Life Csmon: *www.csmon-life.eu/pagina/segnala/all* (all species)
LIFE ASAP: *lifeasap.eu/index.php/it/component/content/article/2-uncategorised/201-segnalazioni* (selected alien species)
Bugmap: *meteo.fmach.it/meteo/bugMap.php* (brown marmorated stink bug)
LIFE SAMFIX: *www.lifesamfix.eu/it/progetto/* (black coffee borer, *Xylosandrus compactus*)
Fitodetective App Regione Lombardia: *play.google.com/store/apps/details?id=net.studiocm.android.ersafAlieni&hl=it&rdid=net.studiocm.android.ersafAlieni* (selected alien plant pests)

LUXEMBURG
Musée national d'histoire naturelle Luxembourg: *data.mnhn.lu/en/enter-single-record* (election of IAS)
iNaturalist - neobiota project: *www.inaturalist.org/projects/neobiota-luxembourg* (selection of IAS)

NETHERLANDS
Waarneming.nl: *waarneming.nl* (reporting portal, all species)
Telmee.nl: *www.telmee.nl* (reporting portal, all species)

FLORON: *www.floron.nl/meedoen/nova* (plants, fungi and lichens)
snApp de exoot: *snappdeexoot.nl* (selection of invasive species)

NORWAY
Norwegian Biodiversity Information Centre: *artsdatabanken.no* (all species)
Artsobservasjoner: *www.artsobservasjoner.no* (all species)
Artsjakten: *www.sabima.no/kartleggingsapp* (selection of common species)

POLAND
Ornitho.pl: *www.ornitho.pl* (birds)
Birdwatching.pl: *www.birdwatching.pl* (birds)
Barszcz.edu.pl: *barszcz.edu.pl* (Sosnowsky's hogweed)

PORTUGAL
Plantas Invasoras: *invasoras.pt* (invasive plants)

SLOVENIA
Invazivke: *www.invazivke.si* (selected IAS)
Bioportal: *www.bioportal.si/moj_bp.php* (all species)

SPAIN AND CATALONIA
Natusfera: *natusfera.gbif.es* (all species)
Observado: *spain.observation.org/index_map.php*
IASTracker: *play.google.com/store/apps/details?id=com.ic5team.iastracker&gl=ES* (selection of IAS)
Vespapp: *vespapp.uib.es* (Asian hornet)
Alerta Forestal: *www.alertaforestal.com* (selected IAS)
Exoticas Murcia: *play.google.com/store/apps/details?id=es.carm.medioambiente.exoticasmurcia&hl=en* (selected IAS)
Ornitho.cat: *www.ornitho.cat* (birds)

SWEDEN
Naturforskaren: *dina-web.net/naturalist* (all species)
Artportalen: *www.artportalen.se* (all species)
Skosskada: *www.slu.se/centrumbildningar-och-projekt/skogsskada* (insects and fungi)

SWITZERLAND
Centre Suisse de Cartographie de la Faune (CSCF): *www.cscf.ch* (all animal species)
Info Flora: *www.infoflora.ch/fr/neophytes.html* (alien plants)

UNITED KINGDOM
iRecord: *www.brc.ac.uk/irecord* (all species)
iSpot: *www.ispotnature.org* (all species)
Recording Invasive Species Counts (RISC): *www.nonnativespecies.org/recording* (selected IAS)
Asian Hornet Watch: *play.google.com/store/apps/details?id=uk.ac.ceh.hornets&hl=en_GB* (Asian hornet)
That's Invasive!: *www.rinse-europe.eu/smartphone-apps* (selected IAS)
Plant Tracker: *planttracker.naturelocator.org* (plants)
iRecord Ladybirds: *www.ladybird-survey.org/recording.aspx* (harlequin ladybird)
AshTag: *livingashproject.org.uk* (ash dieback tolerant trees)
Tree Alert: *www.forestresearch.gov.uk/tools-and-resources/tree-alert* (selected pests)
Report squirrels: *www.northernredsquirrels.org.uk/report-sightings* (squirrels)
Plant Alert: *plantalert.org* (invasive plants in gardens)

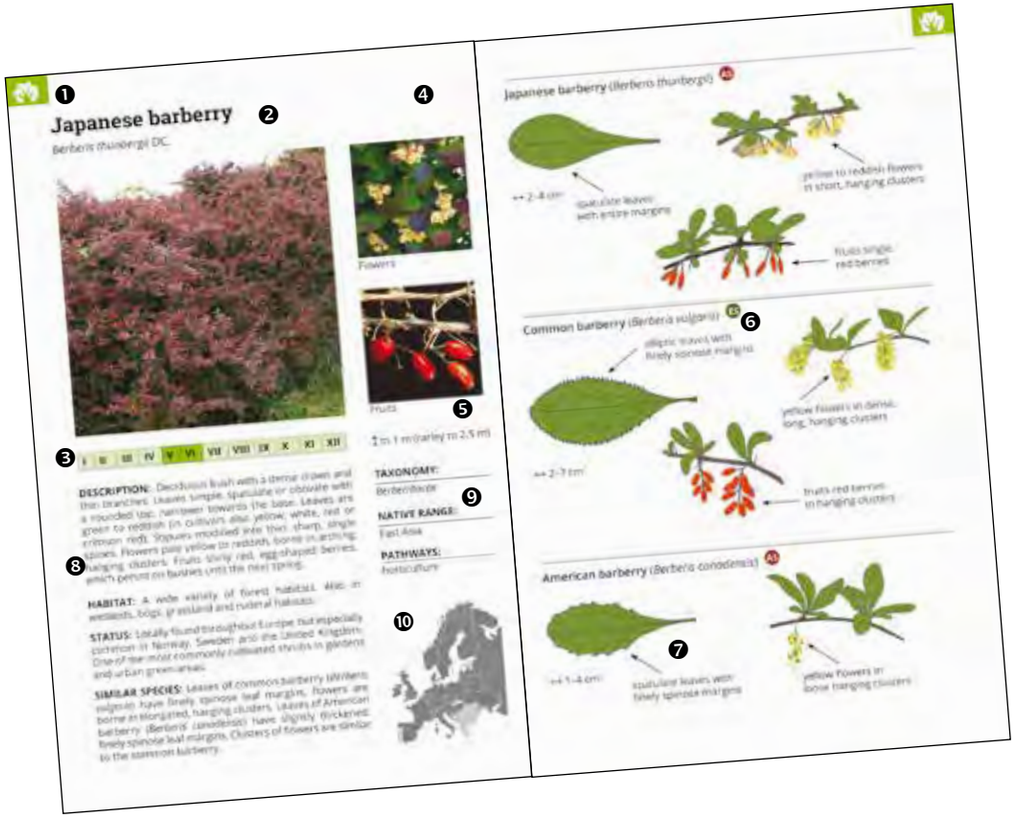
How to use this guide

In this guide, we describe selected alien plants, fungi, insects, birds and mammals. Plant species are subdivided into trees, shrubs, climbing plants and herbaceous plants. Within these broad categories, species follow the taxonomic order of plant families. Fungi are divided to subgroups on basis of the damage which they cause: the diseases of roots and trunk, diseases of bark, cankers, wilt, diseases of shoots and branches, and diseases of leaves and needles. Insects, birds and mammals are arranged in the taxonomic order of families.

Each species is presented on a page with one to three photographs, which show their most distinguishing characters. For some species, drawings on the facing pages depict characters which aid in distinguishing them from the most similar alien and/or native species. Several symbols are used throughout the guide ,which are explained below and on the following pages.

❶ Chapter labels:

Introduction
Fungi
Trees
Insects
Shrubs
Birds and mammals
Climbing plants
Index
Herbaceous plants



❷ **English name and scientific name** of the species and the authorship of the scientific name.

❸ **Identification throughout the year:** In the most intensely-coloured months the species is easily detectable (e.g. due to flowering of plants or flying of insects). Months are coloured more pale when the species is less obvious, but still detectable. In uncoloured months, the species cannot be detected.

❹ **Species listed in the EU legislation and by the EPPO:** Some of the species in the guide are included in legal or advisory documents of the European Plant Protection Organisation (EPPO). Symbols used at the species descriptions and in tables 1–4 have the following meaning:

BIO invasive alien species of Union concern, listed on the European Commission's implementing regulations. Rules of the EU Regulation 1143/2014 apply.

PH species covered by the EU Plant Health legislation.

A1 A2 EPPO List of pests recommended for regulation as quarantine pests (A1 pests are absent from the EPPO region, A2 pests are locally present in the EPPO region).

ALERT EPPO Alert List.

IAP EPPO List of invasive alien plants.

OBS EPPO Observation List of invasive alien plants.

❺ **Size:** the height of entire plants is marked with the symbol ↕ on the left pages. The leaf size is indicated after the symbol ↔ on the right pages.

❻ On the right pages, after the names of species, there is a symbol AS for the **species which are alien to Europe** and symbol ES for the **species which are native to Europe**. Species which are marked with both symbols are native in parts of Europe but alien in others.

❼ **Arrows on the drawings:** the most important identification characters are marked with arrows. Full-lined arrows ⟶ point to characters which are depicted on the drawings, while arrows with dotted line ----➤ point to characters which are only visible on the underside. Drawings are approximately in ratio between the species on the same page, but vary between pages.

❽ **Description:** a brief description of the species with key identification characters is provided. In descriptions of insects and fungi also characteristic damage they cause is described. There is a short description of **habitat** or host plants. The **status** of the species provides a brief summary of the status of the species in temperate European forests. Under the title **similar species** we describe the most similar native or alien species with which the alien species in question could be confused.

❾ **Brief facts:** down the side of the species descriptions, we provide the taxonomic group to which the species belongs, its native range and the main pathways of introduction.

❿ **Maps** of currently known distribution of species are provided in each species account. The countries where the species has already been recorded are coloured dark grey. Maps were compiled on the basis of several European databases: EASIN, CABI, DAISIE, EPPO, Invazivke.si, iNaturalist, Observation.org. In some cases the Flora Croatica Database, Artdatabanken.se and the Online Atlas of the British and Irish flora were checked. In these databases it is not possible to distinguish between planted plants now established, or self-sustaining populations. Some data may refer to plants in gardens and parks and not always to escaped populations. This distinction is not relevant for invertebrates. In the case of mammals, only records in the wild are considered and maps show only the countries where the species has not yet been eradicated.

Alien species in this guide

This guide has primarily been developed as a tool within a system of early warning and rapid response (EWRR) for Slovenian forests. Most species which we present have been included in the alert list of potentially invasive alien species in Slovenian forest [1]. The guide also includes some alien species which in Slovenia are invasive and widespread and at the same time commonly found in forests or along forest edges. In the guide's English edition, additional species are included, which are beginning to spread within European temperate forests. However, many widespread invasive alien species are not included, because we did not want to lose focus on the species from the Alert List.

Table 1: Overview of alien plants described in the guide. See page 10 for an explanation of the used symbols.

English name	Scientific name	EU law	EPPO	Pages in the guide
Trees				
Northern red oak	*Quercus rubra*			24–25
Hackberry	*Celtis occidentalis*			26-27
Paper mulberry	*Broussonetia papyrifera*		OBS	28–29
Black cherry	*Prunus serotina*		IAP	30–31
Staghorn sumac	*Rhus typhina*			32–33
Tree-of-heaven	*Ailanthus altissima*	BIO	IAP	34–35
Boxelder	*Acer negundo*			36–37
Golden rain tree	*Koelreuteria paniculata*			38–39
White ash	*Fraxinus americana*			40–41
Royal paulownia	*Paulownia tomentosa*			42–43

1 de Groot, M., L. Kutnar, D. Jurc, N. Ogris, A. Kavčič, A. Marinšek, J. Kus Veenvliet, A. Verlič. 2017. *Opozorilni seznam potencialno invazivnih tujerodnih vrst v slovenskih gozdovih in možne poti vnosa teh vrst.* [The alert list of potentially invasive alien species in Slovenian forests and possible pathways of their introduction]. Novice iz varstva gozdov št. 10: 8–15.

English name	Scientific name	EU law	EPPO	Pages in the guide
Bushes				
Japanese barberry	*Berberis thunbergii*			46–47
Oregon grape	*Berberis aquifolium*			48–49
Golden currant	*Ribes aureum*			50–51
Cherry laurel	*Prunus laurocerasus*			52–53
Wine raspberry	*Rubus phoenicolasius*			54–55
Japanese spiraea	*Spiraea japonica*			56–57
Common ninebark	*Physocarpus opulifolius*			58–59
Multiflora rose	*Rosa multiflora*			60–61
Juneberry	*Amelanchier lamarckii*			62–63
Purple chokeberry	*Aronia* x *prunifolia*			64–65
Wall cotoneaster	*Cotoneaster horizontalis*			66–67
False indigo	*Amorpha fruticosa*		IAP	68–69
Thorny olive	*Elaeagnus angustifolia*			70–71
Red osier dogwood	*Cornus sericea*		IAP	72–73
Fuzzy deutzia	*Deutzia scabra*			74–75
Amur honeysuckle	*Lonicera maackii*			76–77
Snowberry	*Symphoriocarpos albus*			78–79
Chinese privet	*Ligustrum lucidum*			80–81
Wolfberry, goji beery	*Lycium barbarum*			82–83
Butterfly bush	*Buddleja davidii*		IAP	84–85
Running bamboos	*Phylostachys* spp.			86–87
Climbing plants				
Five-leaf akebia	*Akebia quinata*		OBS	90–91

English name	Scientific name	EU law	EPPO	Pages in the guide
Russian vine	*Fallopia baldschuanica*		IAP	92–93
Japanese hop	*Humulus scandens*	BIO	A2	94–95
Kudzu	*Pueraria montana* var. *lobata*	BIO	A2	96–97
Chinese wisteria	*Wisteria sinensis*			98–99
Frost vine	*Vitis vulpina*			100–101
Bur cucumber	*Sicyos angulatus*		IAP	102–103
Japanese honeysuckle	*Lonicera japonica*			104–105
Cape ivy	*Delairea odorata*		IAP	106–107
Cruel plant	*Araujia sericifera*		OBS	108
Herbaceous plants				
Asiatic dayflower	*Commelina communis*			110–111
American skunk cabbage	*Lysichiton americanus*	BIO	OBS	112–113
American pokeweed	*Phytolacca americana*			114–115
Himalayan knotweed	*Persicaria wallichii*			116–117
Giant knotweed	*Fallopia sachalinensis*		IAP	118–119
Garden lupine	*Lupinus polyphyllus*		OBS	120–121
Himalayan balsam	*Impatiens glandulifera*	BIO	IAP	122–123
Small balsam	*Impatiens parviflora*			124–125
North American asters	*Symphyotrichum* spp.			126–127
Annual fleabane	*Erigeron annuus*			128–129
Candelabra thistle	*Cirsium candelabrum*			130–131
Giant hogweed	*Heracleum mantegazzianum*	BIO	IAP	132–134

Table 2: Overview of alien fungi and bacteria described in the guide

English name	Scientific name	EU law	EPPO	Pages in the guide
Phytophthoras	*Phytophthora* spp.	PH	A2	136
Heterobasidion root disease	*Heterobasidion irregulare*	PH	A2	137
Chestnut blight	*Cryphonectria parasitica*	PH	A2	138
Charcoal disease of oak	*Biscogniauxia mediterranea*			139
Thousand cankers disease	*Geosmithia morbida*	PH	A2	140
Sooty bark disease	*Cryptostroma corticale*			141
Eutypella canker of maple	*Eutypella parasitica*			142–143
Pitch canker of pine	*Fusarium circinatum*	PH	A2	144
Atropellis canker	*Atropellis pinicola*	PH	A1	145
White pine blister rust	*Cronartium ribicola*			146
Dutch elm disease	*Ophiostoma novo-ulmi*			147
Canker stain of plane	*Ceratocystis platani*	PH	A2	148–149
Ash dieback	*Hymenoscyphus fraxineus*			150–151
Canker of balsam fir	*Neonectria neomacrospora*		ALERT	152
Sirococcus shoot blight	*Sirococcus tsugae*			153
Plane-tree powdery mildew	*Erysiphe platani*			154
Dothiostoma blight	*Dothistroma septosporum*	PH		155
Brown-spot needle blight	*Lecanosticta acicola*	PH	A2	156
Alder rust	*Melampsoridium hiratsukanum*			157
Blueberry leaf rust	*Thekopsora minima*	PH	A2	158
Pierce's disease of grapevines	*Xylella fastidiosa*	PH	A2	159

Table 3: Overview of alien insects described in the guide

English name	Scientific name	EU law	EPPO	Pages in the guide
Asian ambrosia beetle	*Xylosandrus crassiusculus*		ALERT	162
Asian longhorn beetle	*Anoplophora glabripennis*	PH	A1	163
Citrus longhorn beetle	*Anoplophora chinensis*	PH	A2	164–165
Red-necked longicorn	*Aromia bungii*	PH	A1	166–167
Japanese cedar longhorn beetle	*Callidiellum rufipenne*			168
Two-lined chestnut borer	*Agrilus bilineatus*		ALERT	169
Emerald ash borer	*Agrilus planipennis*	PH	A2	170–171
Japanese beetle	*Popillia japonica*	PH	A2	172–173
Western conifer seedbug	*Leptoglossus occidentalis*			174–175
Brown marmorated stinkbug	*Halyomorpha halys*			176–177
Citrus flatid leafhopper	*Metcalfa pruinosa*			178
Silver fir woolly adelgid	*Dreyfusia nordmannianae*			179
Sycamore lace bug	*Corythucha ciliata*			180
Oak lace bug	*Corythucha arcuata*			181
Oriental chestnut gall wasp	*Dryocosmus kuriphilus*		A2	182
Zigzag elm sawfly	*Aproceros leucopoda*			183
Asian hornet	*Vespa velutina*	BIO		184–185
Horse-chestnut leafminer	*Cameraria ohridella*			186
Lime leafminer	*Phyllonorycter issikii*			187
Japanese silkmoth	*Antheraea yamamai*			188–189
Box tree moth	*Cydalima perspectalis*			190

Table 4: Overview of alien birds and mammals described in the guide

English name	Scientific name	EU law	EPPO	Pages in the guide
Birds				
Red-billed leiothrix	*Leiothrix lutea*			192–193
Vinous-throated parrotbill	*Sinosuthora webbiana*			194–195
Mammals				
Siberian chipmunk	*Eutamias sibiricus*	BIO		196–197
Grey squirrel	*Sciurus carolinensis*	BIO		198
American red squirrel	*Tamiosciurus hudsonicus*			199
Pallas's squirrel	*Callosciurus erythraeus*	BIO		200
Ring-tailed coati	*Nasua nasua*	BIO		201
Raccoon	*Procyon lotor*	BIO		202
Raccoon dog	*Nyctereutes procyonoides*	BIO		203
Reeves's muntjac	*Muntiacus reevesi*	BIO		204–205

Terminology used in the guide

1. Botanical terms

In the descriptions of plants, some botanical terms are used which need to be understood in order to properly interpret identification characters. Identification is most often carried out on the basis of leaves (complexity, shape, arrangement), flowers, clusters of flowers and fruits.

1.1 Basic leaf terminology

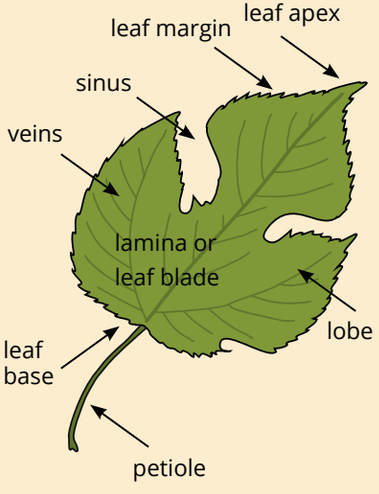


Figure 3. Leaf terminology

1.2 Leaf complexity

Leaves may be simple or compound. Simple leaves have one leaf blade which can be entire or it can be divided into lobes. Such a single leaf blade is shed as an entire unit in autumn. Compound leaves consist of leaflets, which can sometimes be shed separately in autumn. Leaves are palmately compound when leaflets radiate from the top of the petiole with no apparent rachis. Leaves are pinnately compound leaflets are attached laterally along a rachis (figure 4). Pinnately compound leaves which end in a single top-leaflet are called odd-pinnate; when they end without a top-leaf or with a tendril, they are called paripinnate.

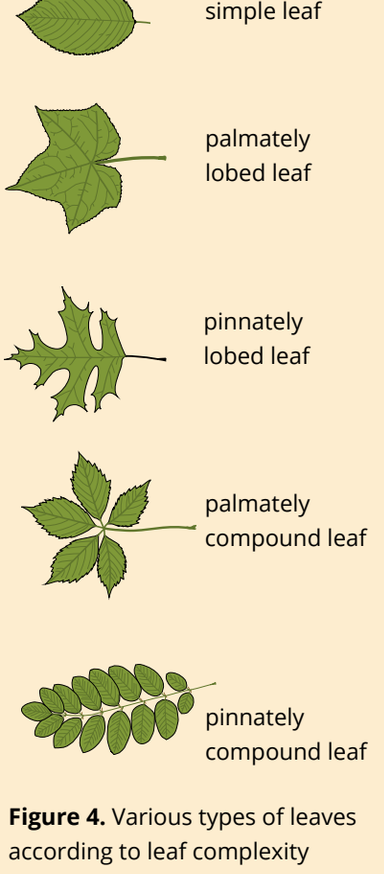


Figure 4. Various types of leaves according to leaf complexity

1.3 Leaf shapes

Leaves (or leaflets in compound leaves) can have various leaf-blade shapes. Some of the main types which appear in this guide are shown in figure 5. Leaves may have intermediate shapes, for example then may be lanceolate-ovate. Leaves on the same plant may vary in shape and therefore several leaves should be checked when making an identification.

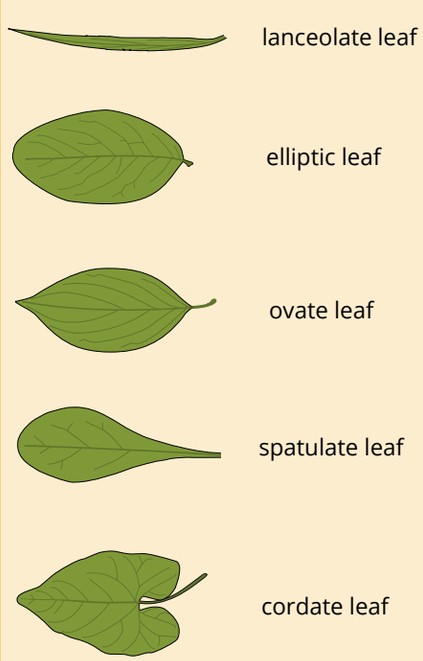


Figure 5. Types of leaves according to the leaf-blade shape

1.4 Leaf-margin shapes

Leaves can have various margin-shapes. In this guide leaves and leaflets are described as having entire, serrulate, serrated, crenate, spinose or wavy margins, see figure 6.

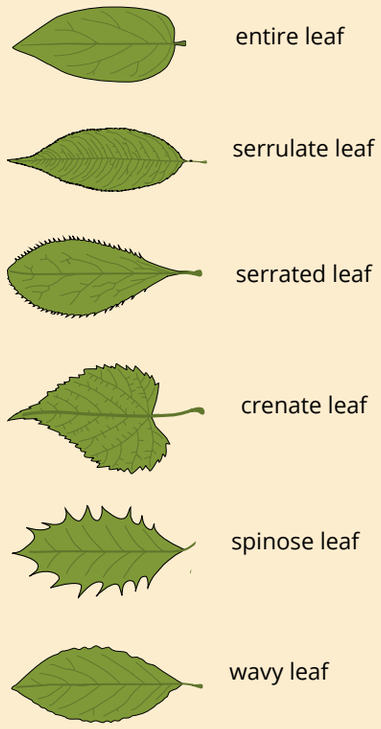


Figure 6. Types of leaves according to the leaf-margin shape

1.5 Leaf arrangement

Leaves are arranged in a particular order along a stem. Leaves are said to be "alternate" when there is a single leaf at each node and the leaves are placed alternating on the left and right side of a branch. "Spiralling" leaves are placed as if they follow an invisible helix around the branch. Leaves are "opposite" when pairs of leaves are attached at each node, opposite to each other. When a pair of leaves is perpendicular to the pair before and after, the arrangement is called "opposite-decussate". The leaf arrangement is "whorled" when there are more than two leaves attached at each node (figure 7).

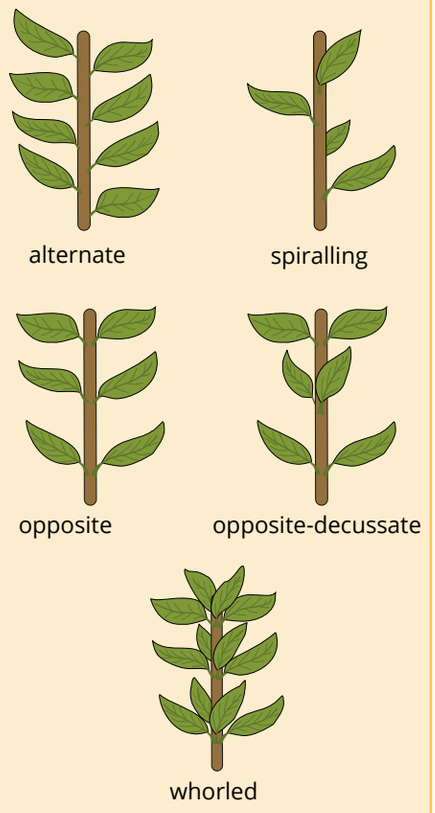


Figure 7. The arrangement of leaves on a stem or branch

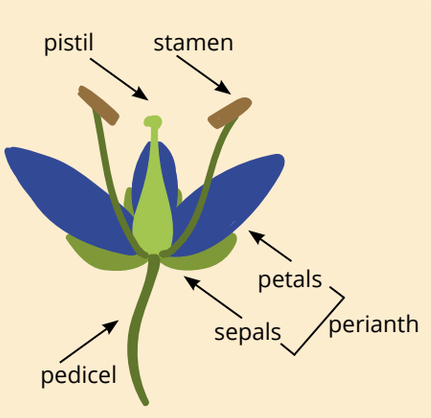


Figure 8. Flower terminology

1.6 Basic flower terminology

The main flower parts are the pedicel and receptacle, perianth, made of petals and sepals, stamens and carpels, which, in angiosperms, is modified into a pistil. The most noticeable part of the flower is the perianth. This consists of sepals, which are often green, but can also have other colours. Their size, shape and placement (spreading or appressed) is often an important identification character. Petals stand out even more as they are often brightly coloured and, compared to the other parts of the flower, rather large. Sepals or petals can be separate from each other or fused to form differently shaped flowers (figure 8).

1.7 Flower arrangement

Plants can have several flowers along a stem. When these are placed on the same floral axis, we call then an inflorescence (figure 9).

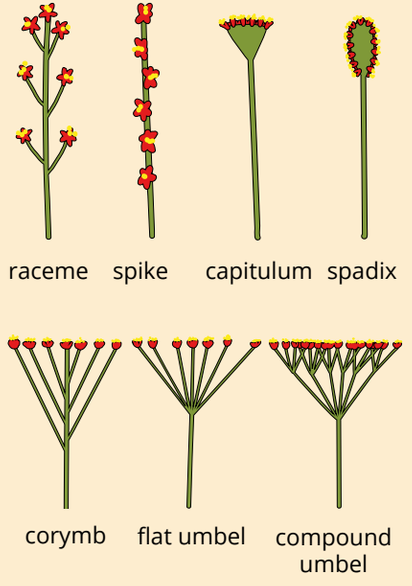


Figure 9. Types of inflorescence arrangement

Achene: dry, one-seeded fruit developing from the inferior ovary, which does not open to release the seed. Typical for the aster family.

Capitulum: type of inflorescence made of disc florets, ray florets and **involucral bracts** (modified leaves which cover the outer side of the inflorescense).

Capsule: a dry fruit which develops from a compound ovary, splitting open in sutures or seeds fall out through openings.

Corymb: type of inflorescence with the flowers growing in such a fashion that the outermost are borne on longer pedicels than the inner, bringing all flowers up to a common level. At the first glance corymb may resemble an umbel, however in this type of inflorescence all pedicels spread from a common point.

Cup (or cupule): a cup-shaped capsule, covered with scale leaves or spines, which is formed from the enlarged receptacle and is partially or entirely enclosing one ore more fruits.

Habitus: characteristic form in which a given species of plant grows.

Infructescence: an organ of some angiosperms developing after fertilisation of flowers which are borne in clusters and the axis is fused with the fruits into one unit which are at maturity dispersed as a whole.

Leaf rachis: the main axis or stem of a compound leaf.

Lenticel: a porous tissue on the bark where air is entering into the plant.

Nutlet: fruit with one seed, similar to a nut. It is formed from a superior ovary and does not open at maturity.

Ovary: the lower part of the pistil that encloses the ovules.

Pappus: a modified calyx, composed of scales, bristles, or feather-like hairs.

Rhizome: a modified stem which grows underground.

Rosette: vegetative part of shoot with short internodes, giving the appearance that leaves are arranged in whorls. It can be placed at the ground (e.g. in the daisy (*Bellis perennis*)) or higher on a stem (e.g. in the wood spurge (*Euphorbia amygdaloides*)).

Ruderal site: a secondary habitat, created by human activity, e.g. waste places, roadsides, rail-road embankments, abandoned fields.

Runner (or stolon); horizontal stem which grows on at the soil surface (example: strawberry).

Variety: an imprecisely defined taxonomical category ranking below the subspecies but above the form. Its is used to denote a group of individuals within sympatric populations of the same species which are differing in certain characteristics from other individuals.

Stipule: differently shaped, usually paired appendage of the petiole at the base of the leaf. It may be present only in the young leaves or permanently, rarely similar to a small leaf or modified into a spine.

Tendril: a simple or branched thread-like organ, modified from a leaf or a stem, used by climbing plants for support and attachment.

2. Glossary of fungi terminology

Apothecium: a fruiting body of sac fungi (Ascomycota) which is cup or disc shaped, typically with a stalk in which asci and ascospores are formed.

Canker: a dead part of bark which is bent or cracked; dying of parts of the cambium or rhytidome; chronic disease caused by dome fungi or bacteria. The tree attempts to heal the wound by forming a callus, thus creating a typical thickening of the bark. A canker may eventually close, but more often a canker wound stays partly open with a sunken centre and a larger or smaller margin of thickened callus.

Disease: any type of metabolic disturbance and of anatomical or histological structure, which appears due to harmful biotic or abiotic factors and weakens the plant, when the disturbance is negatively affecting the ideal or economic value (use) of the plant.

Endophyte: fungi that live within a plant without causing apparent disease. In certain conditions they can become pathogens and damage the plant's tissue.

Hypertrophy: excessive cell growth of or enlargement and thickening of cells of tissues.

Hypha (pl. hyphae): a filamentous chain of cells, fusing into a mycelium

Hypovirulence: a reduced ability of a pathogen to cause infection.

Infection: the process which lasts from the germination of a disease-causing spore and entry into host plant until the establishment of a parasitic relationship with the host. This is the moment when fungi cease to use their reserves and start absorbing nutrients from the host plant.

Mycelial fan: flattened, fanlike array of fungal hyphae.

Mycelium: a vegetative part of a fungus consisting of hyphae.

Macrosporangium: mushroom, a large reproductive organ of fungi, larger than 2 mm. This term is used for macromycetes. The structure carrying macrosporangium is often made of stipe and pileus.

Microsporangium: a small reproductive organ of fungi, up to 2 mm in size. This term is used for microscopic fungi, for e.g. pycnidium, perithecium, apothecium).

Necrosis: death of cells or living tissue.

Parasite: an organism which develops and feeds on another living organism.

Perithecium: a spherical or flask-shaped sexual fruiting body of sac fungi (Ascomycetes) with a thicker layered wall and an with an apical pore (ostiole).

Saprobe or saprotroph: and organism which feeds on organic matter of dead plants or animals.

Spore: a reproductive cell of a fungus.

Virulence: the ability of a parasite to cause an infection.

Wood decay: the process of degrading and decaying wood which is caused by wood-decay fungi.

Wound: rubbed, removed or thorn outer tissue, so that the inner live tissue is exposed.

3. Glossary of insect terminology

3.1 Insect body parts

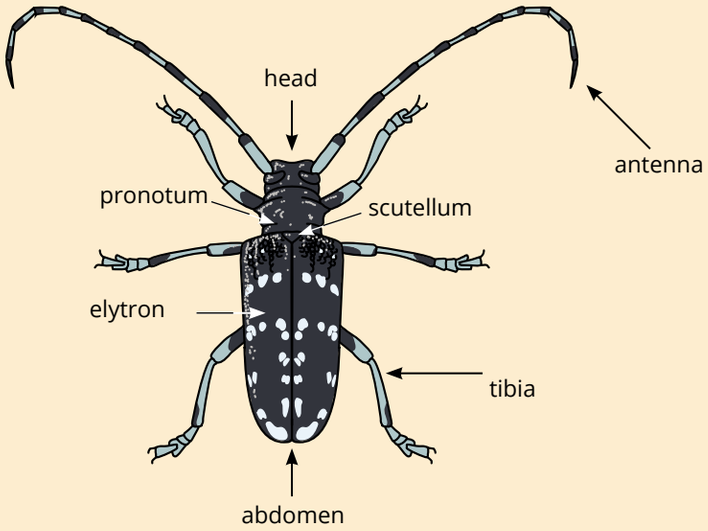


Figure 10. Diagram of a beetle showing various body parts

3.2 Glossary of the most relevant insect terms

Antennae: a paired olfactory sensory organ on the head of insects and other arthropods. They can have a few to several tens of segments and various shapes (filiform, capitate, plumose ...).

Caterpillar: a larva of a butterfly. Butterflies have a complete metamorphosis. Caterpillars feed up intensively feeding, mostly on plants.

Defoliator: an insect which feeds on leaves or needles of trees and shrubs. When high numbers of defoliators appear, they may defoliate entire plants.

Dorsoventrally flattened: a body which is flattened from lower and upper surfaces.

Elytron (pl. elytra): forewing of beetles and earwigs. They protect the second wing pair which is used for flying. They are often structured and coloured and are important in identification.

Gall: an abnormal growth of plant tissues, which is triggered by insects or other organisms. It can be a consequence of mechanical damage, infection by microorganisms, feeding or laying eggs.

Polyphage: animal feeding on various types of food.

Pronotum: chitinous front part of the thorax of insects, posterior to the head.

Pupa (pl. pupae): the third stage in the development cycle of insects which have with complete metamorphosis. The life cycle of these insects has four stages: egg, larva, pupa, adult. In pupal stage, the larval organs break down and adult organs are formed. Pupae do not feed and have limited mobility.

Scutellum: the chitinous shield on the dorsal part of mesothorax of insects, between the posterior edge of pronotum and front edge of elytra.

Trees

Authors: Lado Kutnar, Aleksander Marinšek, Jana Kus Veenvliet, Paul Veenvliet, Johan L.C.H. van Valkenburg

Northern red oak

Quercus rubra L.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Medium-sized to large, deciduous tree with a robust trunk and a rounded crown. Bark on young stems smooth, older bark with shallow furrows. Twigs with multiple terminal buds, quite large, conical. Leaves simple, with bristle-tipped lobes which are about as broad as the sinuses between them. Only minute hairs are left in vein axils. Leaves are dark green, sometimes shiny above, and pale green below. Autumn leaf colour intense dark red to orange-brown. Fruits (acorns) mature over two growing seasons. They are almost round with a shallow cap which is covered with appressed scales.

HABITAT: A variety of forest habitats, often on sandy soil.

STATUS: In Europe planted in parks, gardens and forests. Widespread in most European countries.

SIMILAR SPECIES: The most similar is another North American oak – pin oak (*Quercus palustris*), which has much deeper sinuses between the lobes. Leaves of Turkey oak (*Quercus cerris*) are usually smaller, and some are unevenly lobed. All oak species can be easily distinguished by the appearance of their acorns.

Deeply lobed leaves

Bark with shallow furrows

↥ 20–40 m

TAXONOMY:

Fagaceae

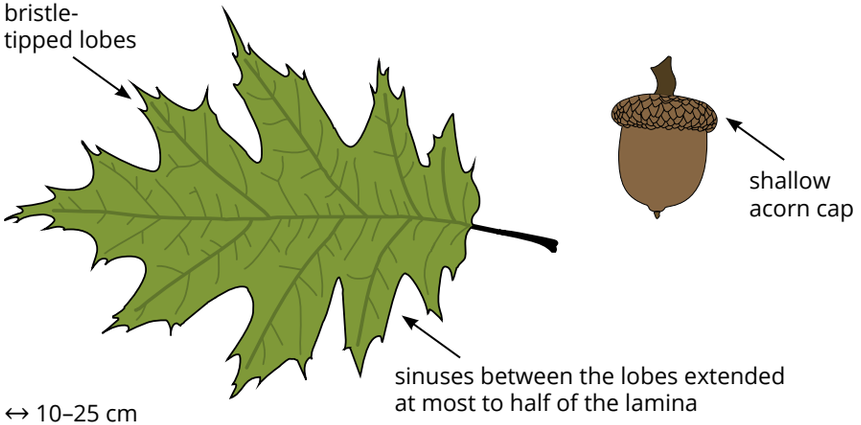
NATIVE RANGE:

eastern North America

PATHWAYS:

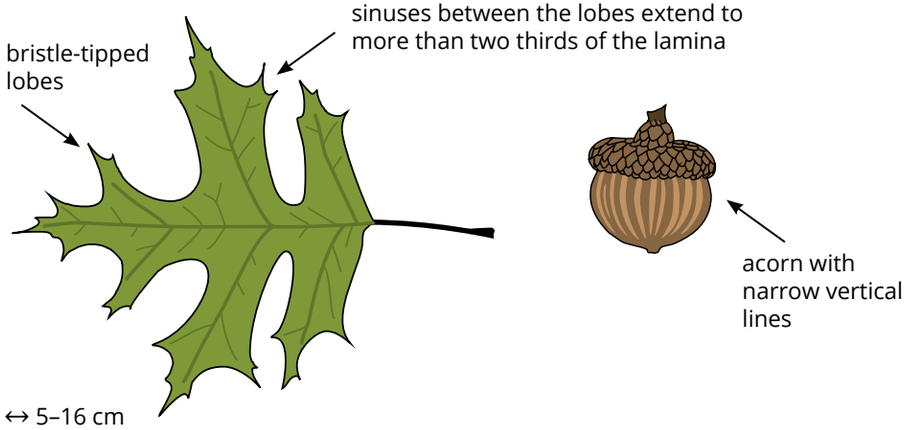
horticulture, silviculture

Northern red oak (*Quercus rubra*) AS



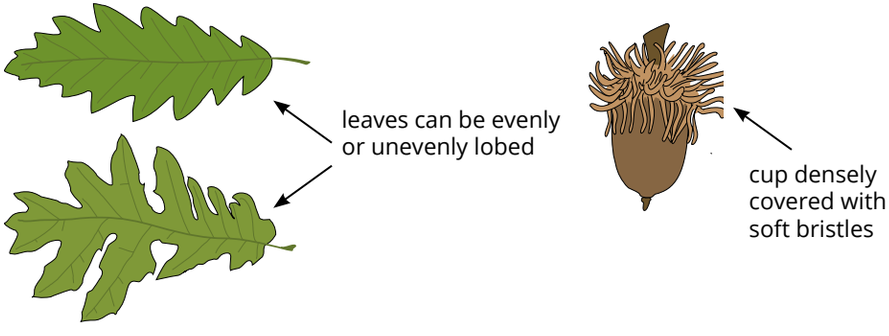
↔ 10–25 cm

Pin oak (*Quercus palustris*) AS



↔ 5–16 cm

Turkey oak (*Quercus cerris*) ES



↔ 7–14 cm

Hackberry

Celtis occidentalis L.

Asymmetric leaf

Ripe fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 35 m

DESCRIPTION: Small to medium-sized, deciduous tree with a wide spreading crown. Bark dark grey with deep, vertical furrows. Leaves simple, oblong-ovate or elliptic with asymmetric base and serrated margins. These are smooth, shiny green above, paler below and somewhat pubescent along veins. Flowers are monoecious, green, small and inconspicuous. Fruits are round drupes 7–10 mm in diameter, with a 1–2 cm long stalk. Fruits turn orange, then dark purple as they ripen.

HABITAT: A variety of forest habitats including riparian forests, but not in places which are frequently flooded.

STATUS: Recorded locally, especially in Germany and France.

SIMILAR SPECIES: European hackberry (*Celtis australis*) has a smooth bark, similar to beech. Leaves of the European hackberry have a slightly asymmetric base and a pubescent underside. Fruits have a similar shape but are black when ripe. Sugarberry (*Celtis laevigata*) has narrower leaves which are entire or with several teeth. Bark has many corky warts but smooth in between.

TAXONOMY:

Ulmaceae

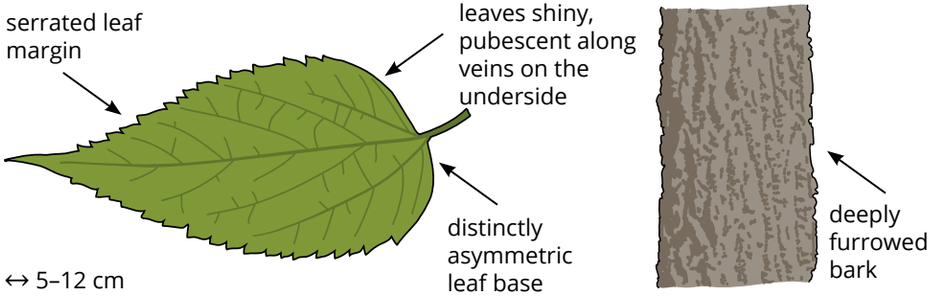
NATIVE RANGE:

North America

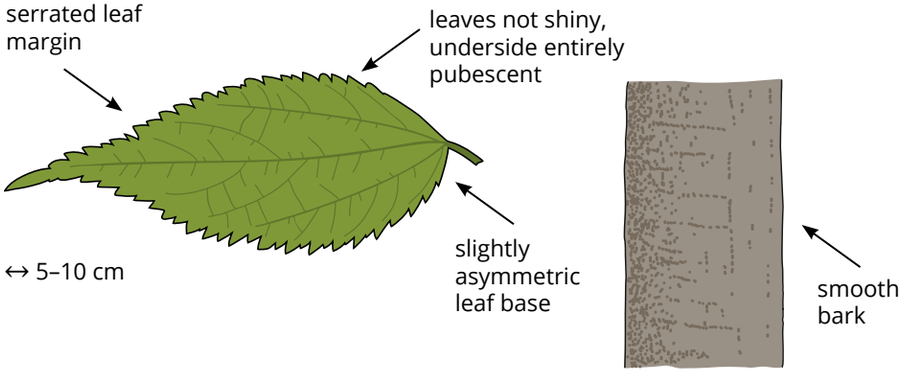
PATHWAYS:

horticulture, silviculture

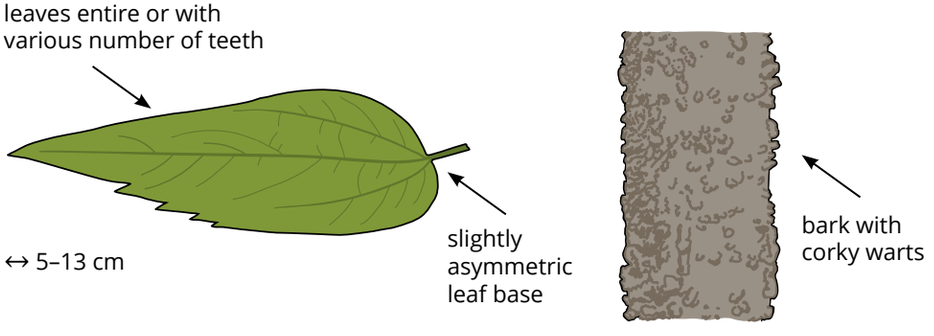
Hackberry (*Celtis occidentalis*) AS



European hackberry (*Celtis australis*) ES



Sugarberry (*Celtis laevigata*) AS



Paper mulberry

OBS

Broussonetia papyrifera Vent.

Catkins

Unripe and ripe fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 15–20 m

DESCRIPTION: Dioecious, deciduous small tree, sometimes a bush. Twigs are stout, initially densely hirsute. Leaves simple and undivided on older trees, but leaves on young plants have deep irregular sinuses. Margins serrated. Leaves are rough above, velvety and grey beneath. Male inflorescence in hanging catkins 6–8 cm long. Female inflorescence greenish, round, about 2 cm in diameter. Fruit is an aggregate of red to orange drupes, up to 3 cm in diameter.

HABITAT: Ruderal sites, roadsides, forest margins and open forests, riparian forests. More common in areas with mild climate.

STATUS: Present in most European countries, widespread in France, Spain and Italy.

SIMILAR SPECIES: Common fig (*Ficus carica*) and white mulberry (*Morus alba*) have similarly shaped leaves, but these have glabrous, green undersides.

TAXONOMY:

Moraceae

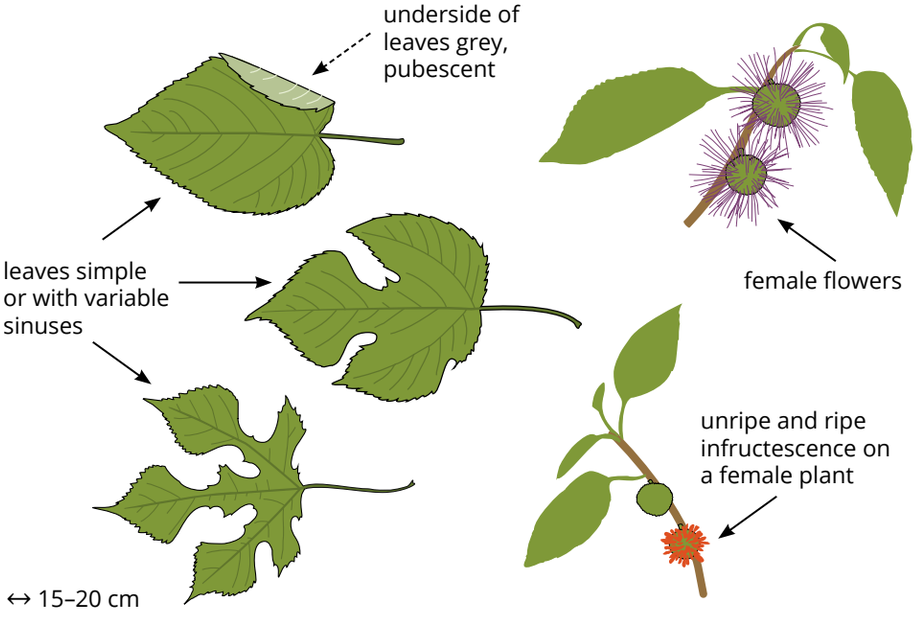
NATIVE RANGE:

East Asia

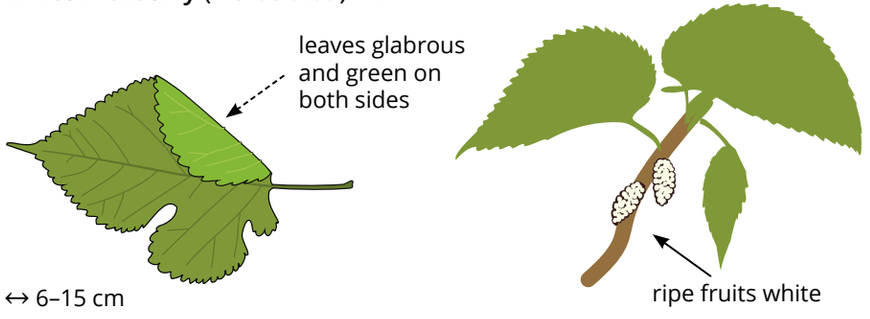
PATHWAYS:

horticulture

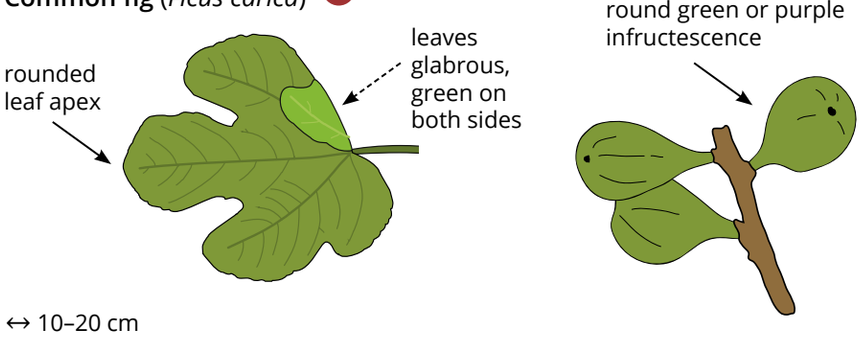
Paper mulberry (*Broussonetia papyrifera*) AS



White mulberry (*Morus alba*) AS



Common fig (*Ficus carica*) AS



Black cherry

IAP

Prunus serotina Ehrh.

Pubescence along mid-rib

Unripe and ripe drupes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 20–30 m

DESCRIPTION: Deciduous tree or bush with a round crown and dense pendulous branches. Leaves do not emerge until late spring; in autumn they colour late, and fall from trees just before winter. Bark on young trees smooth, on older trees black-brown with deep furrows breaking into rough plates. Leaves are leathery, dark green and lustrous above; below paler, with dense orange-white pubescence along mid-rib. Leaf apex acuminate, leaf margin crenate. Flowers small, white, borne in narrow, hanging clusters. Fruits round drupes, initially reddish, and purplish-black when ripe.

HABITAT: Forest margins and open forests, in open wetlands, heathlands, dry grassland and dunes.

STATUS: Widespread and common in Western Europe, where it was extensively planted in the past. Occurs locally elsewhere in Europe.

SIMILAR SPECIES: Bird cherry (*Prunus padus*) grows to 14 m high. Bark dull grey and does not crack or peel off. Leaf margins serrated, leaves dull green, thin and glabrous except for a few tufts of hairs at vein axils. Flower clusters are very similar to those of black cherry.

TAXONOMY:

Rosaceae

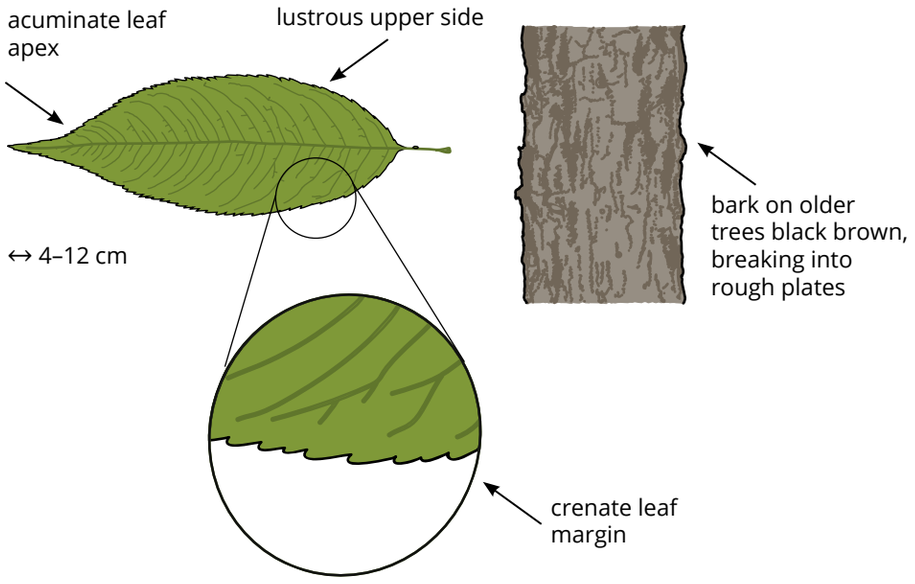
NATIVE RANGE:

North America

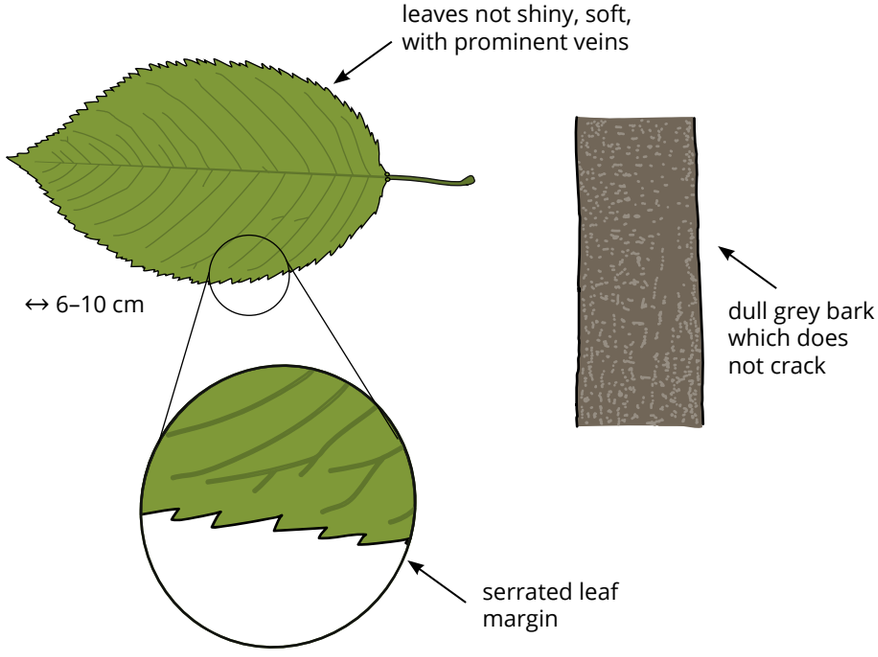
PATHWAYS:

horticulture, silviculture

Black cherry (*Prunus serotina*) AS



Bird cherry (*Prunus padus*) ES



Staghorn sumac

Rhus typhina L.

Fuzzy young branches

A cultivated form with divided leaves

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 5–7 m

DESCRIPTION: Small tree or shrub with a wide, spreading, open crown. Leaves large, pinnately compound with 13–27 lanceolate leaflets which have serrate margins (in a cultivated form deeply divided). Rachis of leaflets, twigs and young branches are covered with fine hairs. Flowers small, greenish-yellow, borne in upright clusters. Fruits are fuzzy, red, borne in upright, conical, dense clusters which remain on plants until next spring.

HABITAT: Ruderal sites, forest margins and clearings, mostly on dry soil. It is mainly spreading vegetatively with transported soil and because of this it is often found at roadsides.

STATUS: Recorded locally throughout Europe.

SIMILAR SPECIES: Tree-of-Heaven (*Ailanthus altissima*) has similar large, pinnately compound leaves, which have large, glandular teeth near the base but the leaf margin is not serrated. Twigs and branches are not covered with hairs. Fruits are single samaras. Shining sumac (*Rhus copallinum*) has prominent wings on rachis between the leaflets, fruit clusters are loose and hanging. Smooth sumac (*Rhus glabra*) does not have hairs on leaflets and young branches.

TAXONOMY:

Anacardiaceae

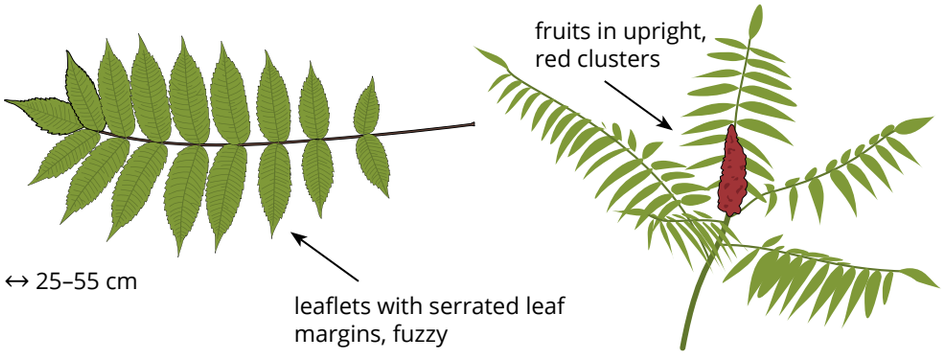
NATIVE RANGE:

North America

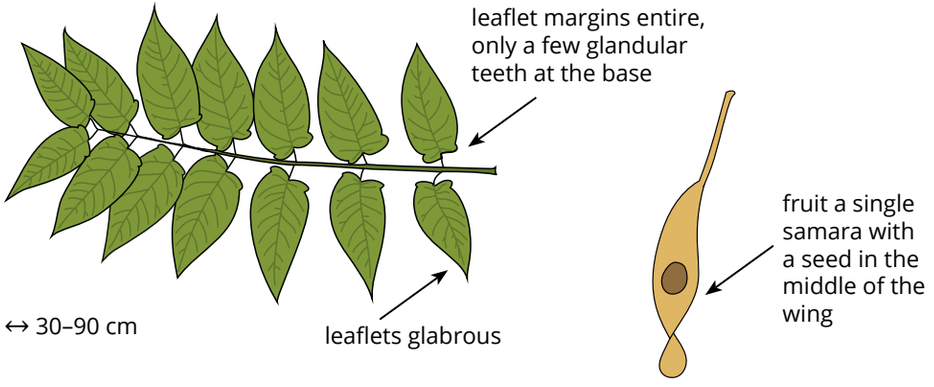
PATHWAYS:

horticulture

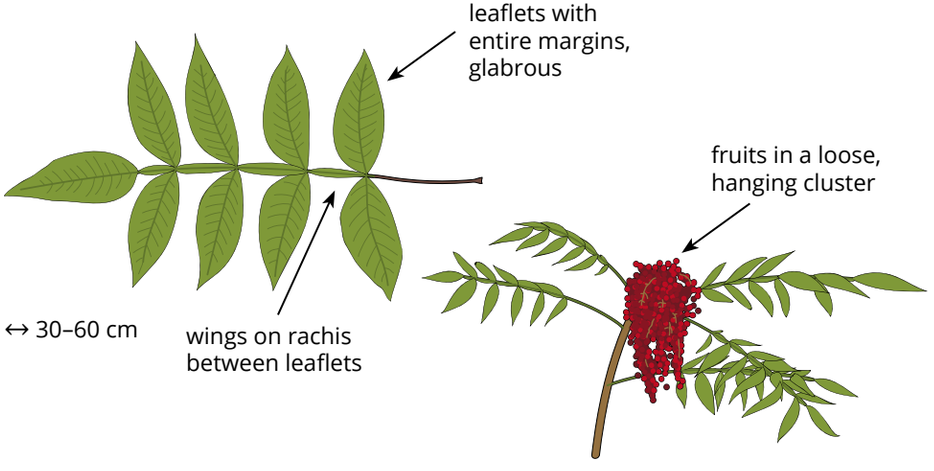
Staghorn sumac (*Rhus typhina*) AS



Tree-of-heaven (*Ailanthus altissima*) AS



Shining sumac (*Rhus copallinum*) AS



Tree-of-heaven

Ailanthus altissima (Mill.) Swingle

BIO IAP

Fruits

Glandular teeth at the base of leaflets

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 17–27 m

DESCRIPTION: Dioecious, deciduous tree with thick branches. Bark smooth, greyish. Leaves 30–90 cm long, spiralling, glabrous, pinnately compound. Leaflets lanceolate, pointed at the tip, with 2–4 glandular lobes near the base. Leaflets, male flowers and young shoots have a foul odour. Flowers are small, borne in large, dense, upright clusters. Fruits are lanceolate samaras several centimetres long with a seed in the centre. They develop on female plants and persist on trees until the following spring.

HABITAT: Forest margins and open forests, including riparian forests and open rocky slopes. Also established at ruderal sites, along roadsides and in urban habitats.

STATUS: Widely established throughout Europe, particularly common in the Mediterranean region and in urban areas.

SIMILAR SPECIES: European ash (*Fraxinus excelsior*) black walnut (*Juglans nigra*), Manchurian walnut (*J. mandshurica*) and staghorn sumac (*Rhus typhina*) do not have glandular lobes on leaflet bases. Staghorn sumac has fuzzy leaflets with serrate margins and upright clusters of fruits.

TAXONOMY:

Simaroubaceae

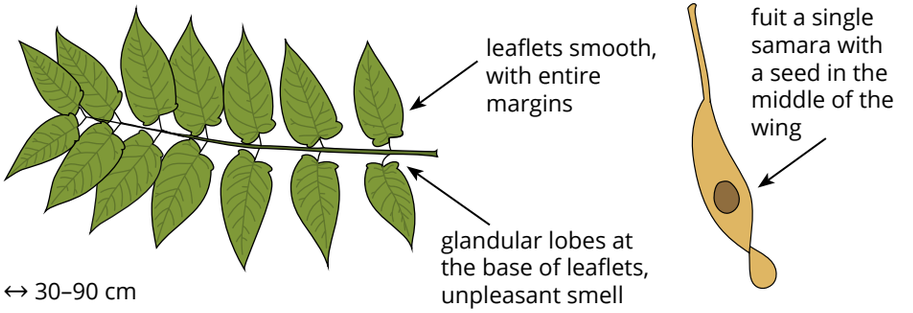
NATIVE RANGE:

East Asia

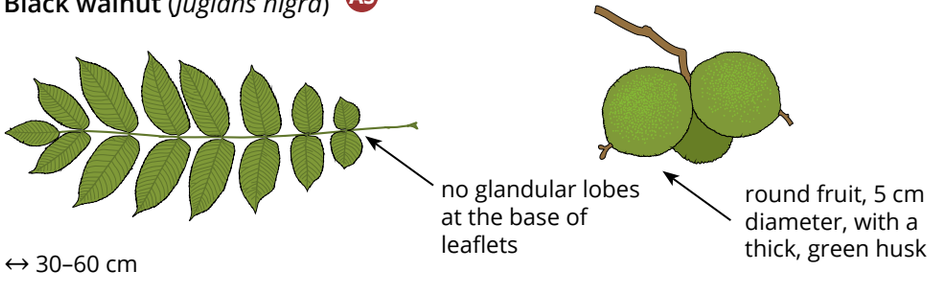
PATHWAYS:

horticulture, silviculture

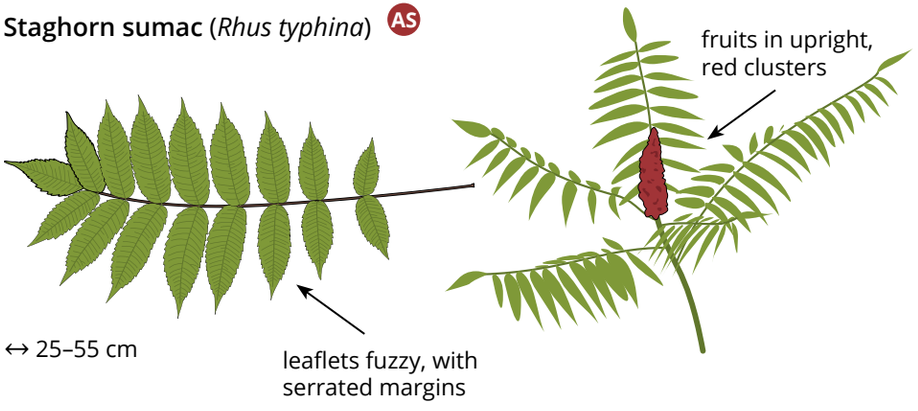
Tree-of-heaven (*Ailanthus altissima*) AS



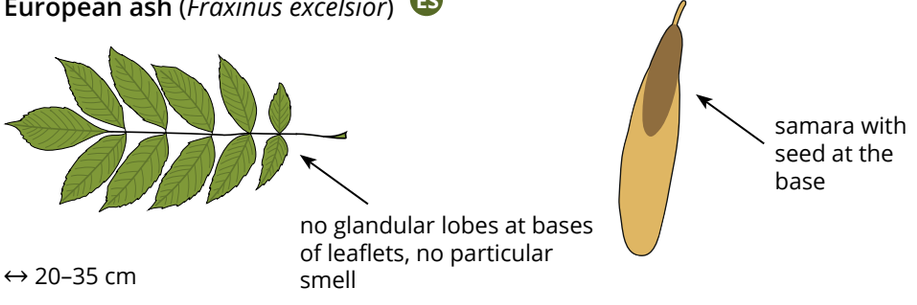
Black walnut (*Juglans nigra*) AS



Staghorn sumac (*Rhus typhina*) AS



European ash (*Fraxinus excelsior*) ES



Boxelder

Acer negundo L.

Samaras

Cultivated form

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 20–25 m

DESCRIPTION: Dioecious, deciduous, medium sized tree. Usually growing upright; in the shadow of other trees sometimes bending or trailing. Bark thin with shallow furrows, on young shoots green, later turning to grey or light brown. Leaves opposite, pinnately compound with 3 to 5 leaflets (sometimes 7). Leaflets are widely lanceolate to ovate with a short petiole. Terminal leaflet often three lobed. Leaflets light green above, and paler below. Flowers yellow-green, with long stalks, in hanging clusters. Fruits paired V-shaped samaras, in hanging clusters.

HABITAT: Riparian forests, ruderal sites and urban habitats.

STATUS: Widely established throughout Europe.

SIMILAR SPECIES: Vine-leaved maple (*Acer cissifolium*) and Nikko maple (*Acer maximowiczianum*) have similar compound leaves with three leaflets. Vine-leaved maple always has only three leaflets which have serrated margins and red stalks. Nikko maple has broad leaflets which are shallowly serrated with obtuse teeth. The undersides of its leaves are hairy and greyish.

TAXONOMY:

Aceraceae

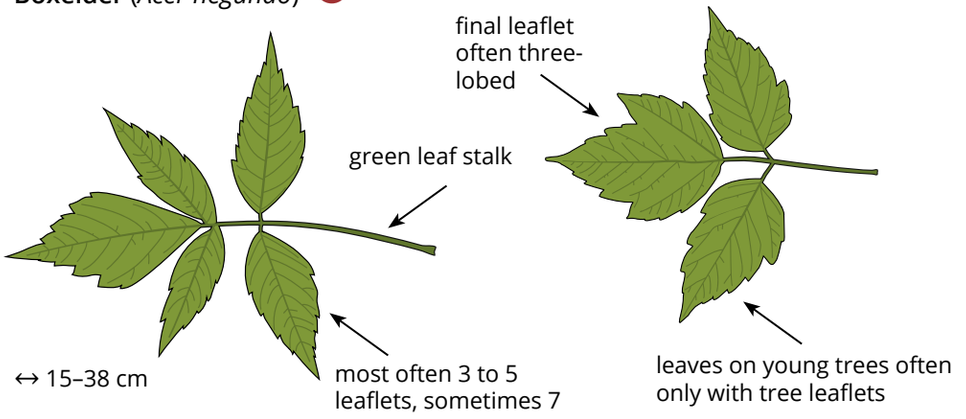
NATIVE RANGE:

North America

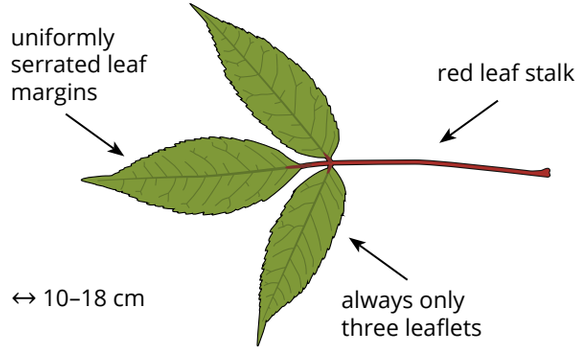
PATHWAYS:

horticulture, silviculture

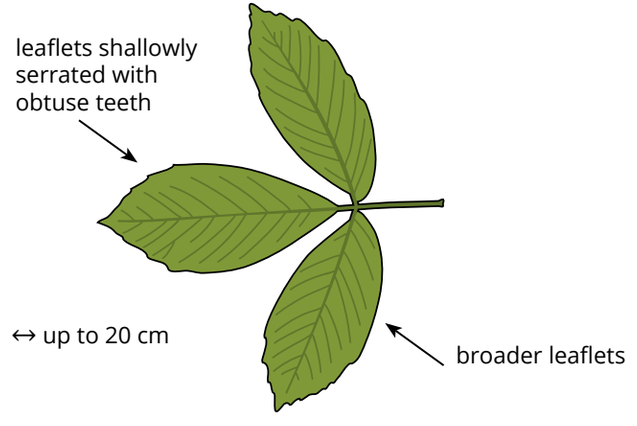
Boxelder (*Acer negundo*) AS



Vine-leaved maple (*Acer cissifolium*) AS



Nikko maple (*Acer maximowiczianum*) AS



Golden rain tree

Koelreuteria paniculata Laxm.

Inflorescence

Fruits triangular capsules

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 15 m

DESCRIPTION: Small deciduous tree with dense crown and thick, upwardly curved branches. Bark with flat ridge tops. Leaves pinnately compound, with 7 to 15 oval leaflets which have many irregular serrations and acute apex. Young leaflets in spring reddish, in autumn yellow to orange. Flowers small, yellow, borne in branched panicles up to 40 cm long. Fruits triangular capsules, which have three pronounced veins over the middle of each side. In each of the seed compartments there is one globular, black seed. Fruits are initially green, when ripe brown and persist throughout winter.

HABITAT: In its native range growing especially on rocky cliffs with open forest. In Europe also found in riparian forests, urban habitats and ruderal sites.

STATUS: Found locally; most records are from France and the United Kingdom.

SIMILAR SPECIES: Common bladdernut (*Staphylea pinnata*) and bladder senna (*Colutea arborescens*) have similar fruits. However, leaves are smaller and compound leaflets with entire margins. Kentucky coffeetree (*Gymnocladus dioicus*) has similarly divided leaves, but leaflets have an entire margin. The fruit is a long pod.

TAXONOMY:

Sapindaceae

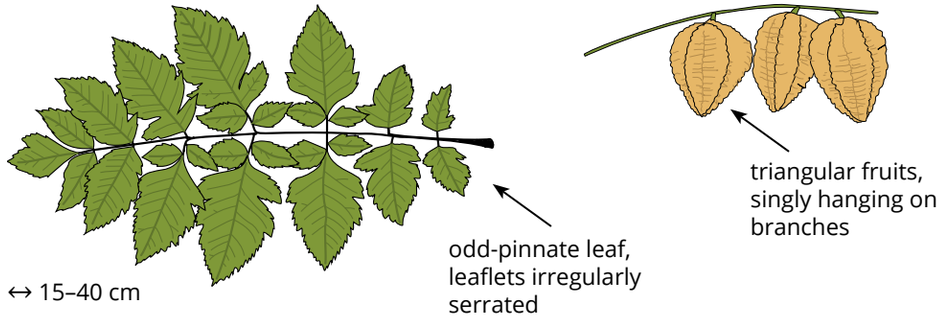
NATIVE RANGE:

Asia (China, Korea, Japan)

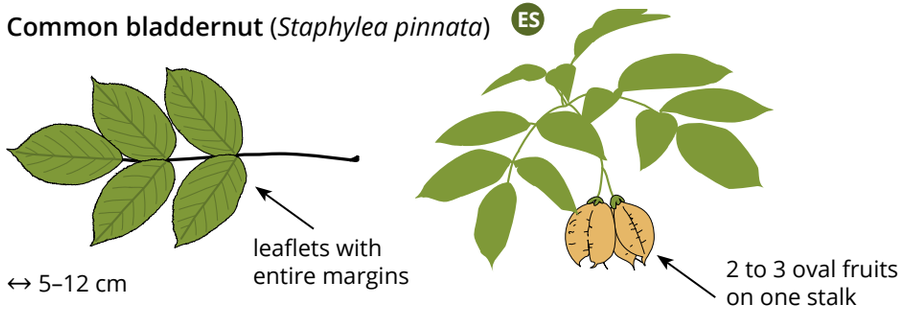
PATHWAYS:

horticulture

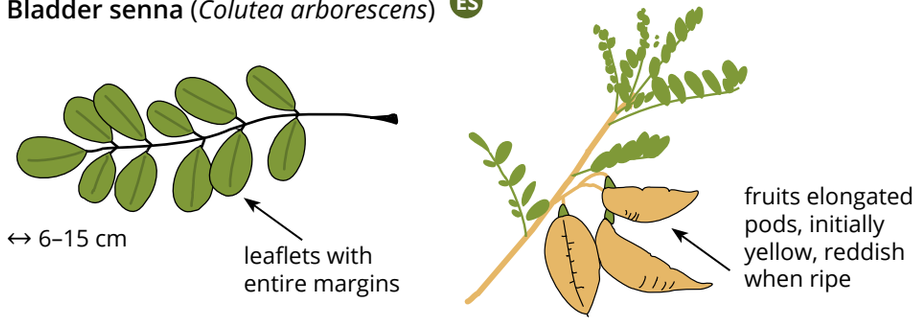
Golden rain tree (*Koelreuteria paniculata*) AS



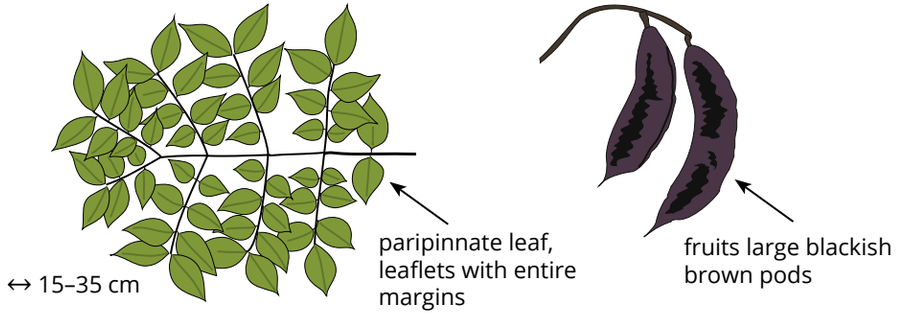
Common bladdernut (*Staphylea pinnata*) ES



Bladder senna (*Colutea arborescens*) ES



Kentucky coffeetree (*Gymnocladus dioicus*) AS



White ash

Fraxinus americana L.

Samaras

Bark with corky ridges

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 17–27 m

DESCRIPTION: Large, deciduous, dioecious tree. Bark grey to brown, already in young trees cracking and forming corky ridges. Twigs olive-green, hairless, shiny. Leaves pinnately compound with 5 to 9 lanceolate to elliptic leaflets. These are dark green above, greyish-white below, mostly glabrous. In autumn, they colour yellow, red or purple. Flowers of both sexes are without petals and have only a small calyx, about 1 mm long. The fruit is a single 3–5 cm long samara, often with a visible leftover of calyx. The wing of the samara does not extend beyond the rounded seed cavity of the samara.

HABITAT: Found mainly in riparian forests.

STATUS: Locally recorded throughout Europe.

SIMILAR SPECIES: Leaves of green ash (*F. pennsylvanica*), narrow-leaved ash (*F. angustifolia*) and European ash (*F. excelsior*) have green underside. Green ash has grey to green-brown twigs which can be glabrous or pubescent. The seed in the samara is flattened, with a wing extending beyond the seed cavity. The samaras of European ash are broader.

TAXONOMY:

Oleaceae

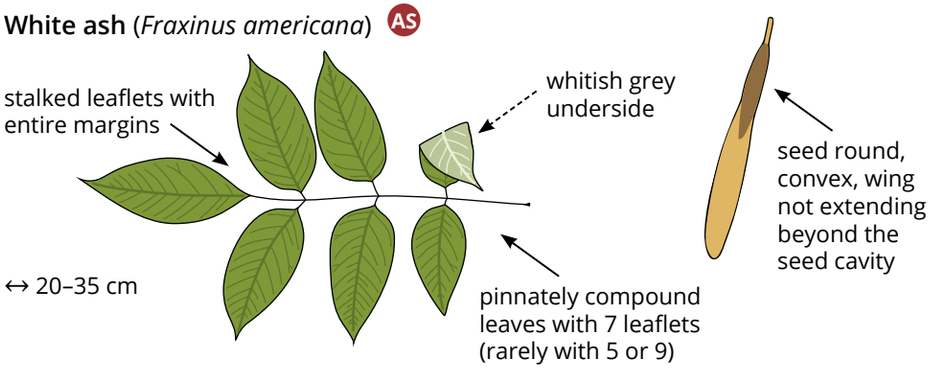
NATIVE RANGE:

eastern North America

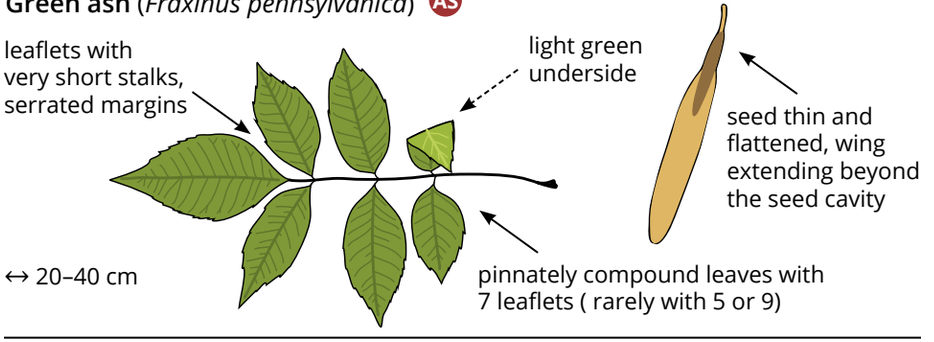
PATHWAYS:

silviculture, horticulture

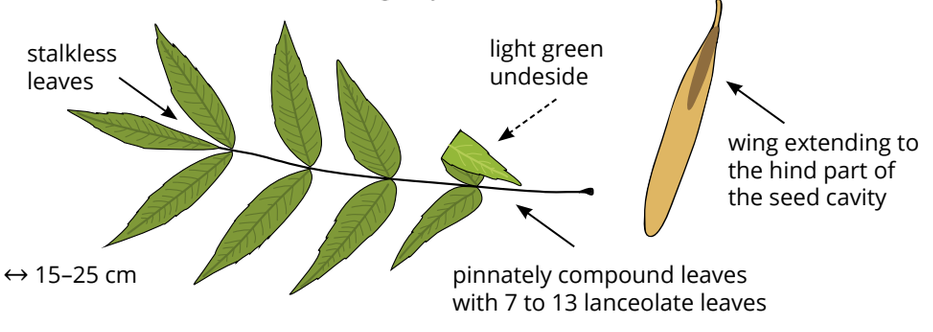
White ash (*Fraxinus americana*) AS



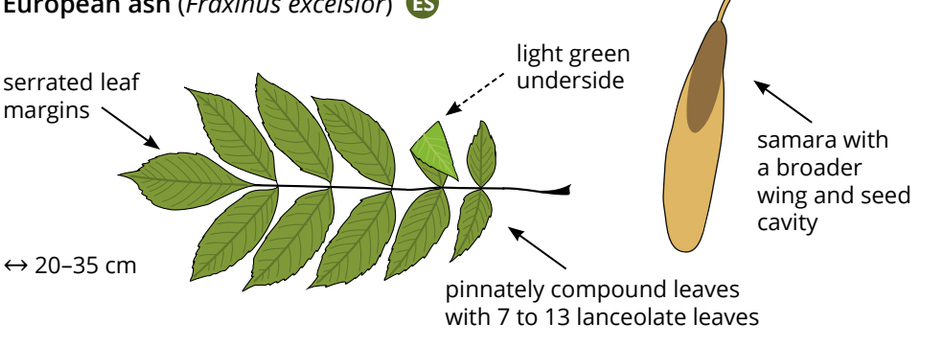
Green ash (*Fraxinus pennsylvanica*) AS



Narrow-leaved ash (*Fraxinus angustifolia*) ES



European ash (*Fraxinus excelsior*) ES



Royal paulownia

Paulownia tomentosa (Thunb.) Sieb. & Zucc. ex Steud.

Flowers in panicles

Fruit capsules

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 15–20 m

DESCRIPTION: Fast-growing, deciduous tree. Leaves large, opposite, heart-shaped, shortly acuminate, with entire margins. Younger leaves often coarsely serrated or lobed. Leaves velvety green above, paler below. Flowers appear before the emergence of leaves, are borne in panicles. Corolla 3–5 cm long, tube-like, purple to white. Fruit is an oval capsule a few centimetres long, similar to a nut. It contains numerous small seeds which fall out of the capsules throughout summer and autumn.

HABITAT: Forest margins and clearings, riparian forests, as well as ruderal sites and rocky habitats.

STATUS: Locally recorded throughout Europe.

SIMILAR SPECIES: Southern catalpa (*Catalpa bignonioides*) has similar leaves but only the underside is slightly pubescent. Leaves arranged in whorls of three. Flowers are white with purple streaks, in branched clusters. They appear after the emergence of leaves. Fruits are long, brown, pod-like capsules. Sunflower (*Helianthus annuus*) can before flowering appear similar to the young royal paulownia, but sunflower has spirally arranged leaves and serrated margins.

TAXONOMY:

Paulowniaceae

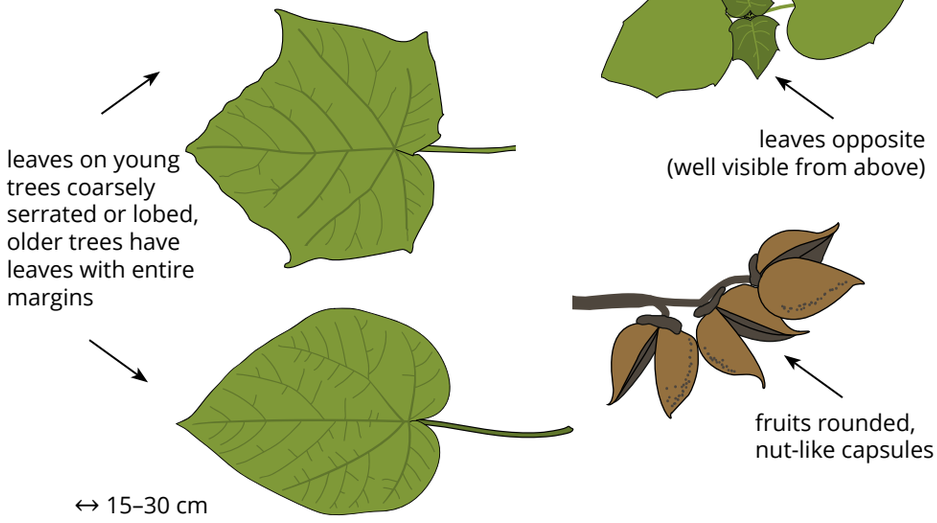
NATIVE RANGE:

eastern Asia (China)

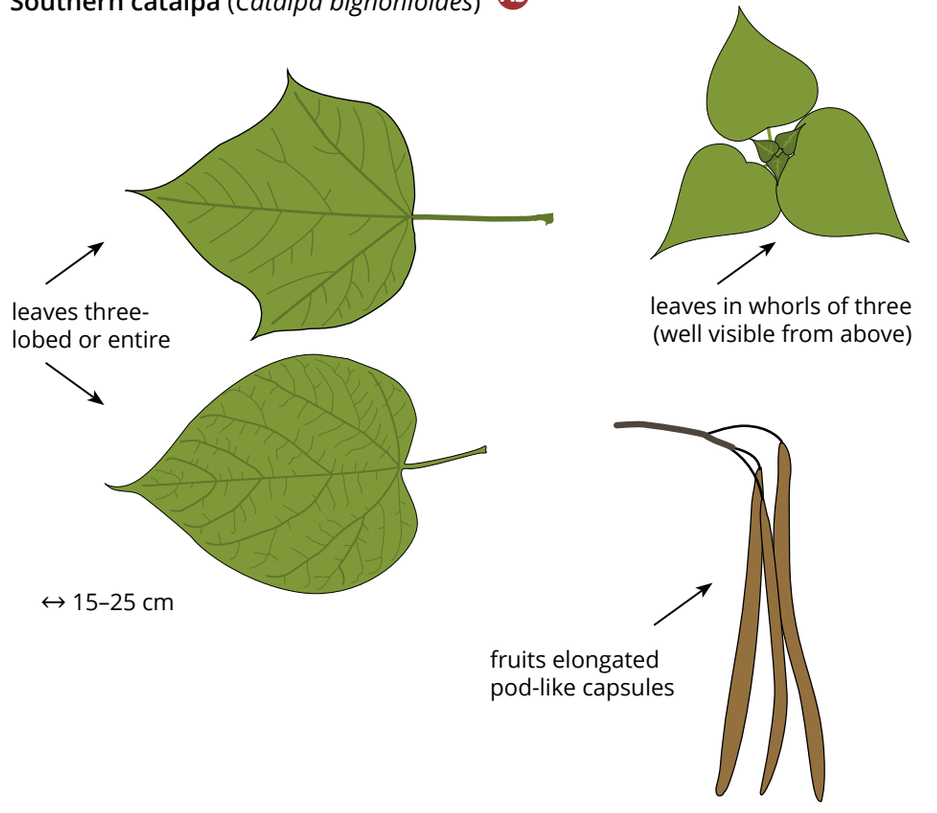
PATHWAYS:

horticulture, plantations

Royal paulownia (*Paulownia tomentosa*) AS



Southern catalpa (*Catalpa bignonioides*) AS



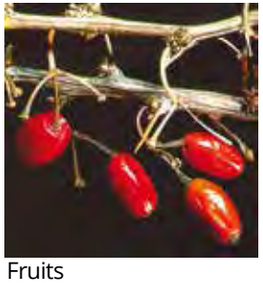
Shrubs

Authors: Lado Kutnar, Aleksander Marinšek, Jana Kus Veenvliet, Paul Veenvliet, Johan L.C.H. van Valkenburg, Jan Pergl

Japanese barberry

Berberis thunbergii DC.

Flowers



Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ to 1 m (rarley to 2.5 m)

DESCRIPTION: A deciduous, dense-crowned bush with thin branches. Leaves are simple, spatulate or obovate with a rounded top; narrower towards the base. Leaves are green to reddish, in cultivars also yellow, red or partly white. Stipules are modified into thin, sharp, single spines. The flowers are pale yellow to reddish, borne in arching, hanging clusters. Fruits are shiny red, egg-shaped berries, which persist until the next spring.

HABITAT: A wide variety of forest habitats, wetlands, bogs, grassland and ruderal habitats.

STATUS: Locally found throughout Europe, but especially common in Norway, Sweden and the United Kingdom. One of the most commonly cultivated shrubs in gardens and urban green areas.

SIMILAR SPECIES: Leaves of common barberry (*Berberis vulgaris*) have finely spinose leaf margins, flowers are borne in elongated, hanging clusters. Leaves of American barberry (*B. canadensis*) have slightly thickened, finely spinose leaf margins. Clusters of flowers are similar to the common barberry.

TAXONOMY:

Berberidacae

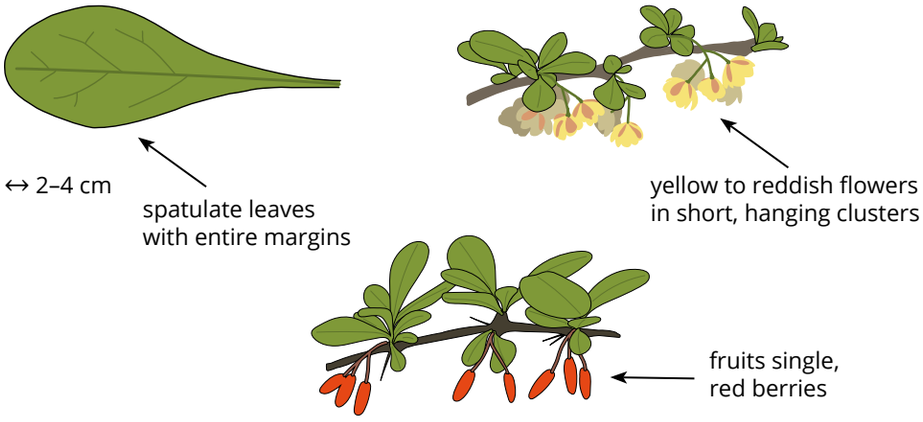
NATIVE RANGE:

East Asia

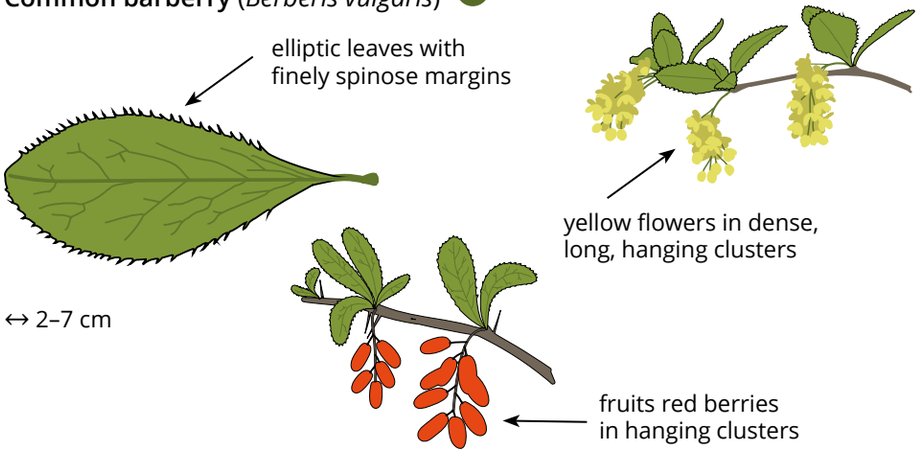
PATHWAYS:

horticulture

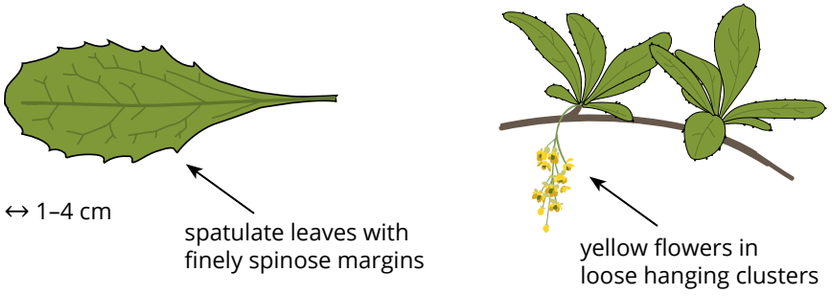
Japanese barberry (*Berberis thunbergii*) AS



Common barberry (*Berberis vulgaris*) ES



American barberry (*Berberis canadensis*) AS



Oregon grape

Berberis aquifolium Nutt., syn. *Mahonia aquifolium* (Pursh) Nutt.

Flowers

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 1–3 m

DESCRIPTION: A tall, evergreen shrub with numerous erect stems. Leaves are pinnately compound, typically with one terminal leaflet and 2 to 6 pairs of opposite leaflets. These are lanceolate, with a thick, waxy cuticle and 6 to 13 spined teeth along margins. They are glossy green above and paler green below. Flowers are small and bright yellow, borne in upright clusters. Fruits are small, dark blue berries, covered with a waxy bloom.

HABITAT: Grows in deciduous and coniferous forests up to 2,100 m above sea level. Mostly on calcareous soils, both in open habitats and in the shade of trees.

STATUS: Locally naturalised throughout Europe. Often cultivated in gardens and on graveyards.

SIMILAR SPECIES: Leatherleaf mahonia (*B. bealei*), is an up to 8 metres high shrub with pinnately compound leaves which consist of 4 to 7 leaflet pairs, which have 5 to 7 spined teeth along margins. Flowers are yellow, borne in up to 30 cm long upright racemes. Fruits are oval, up to 15 mm long, dark purple berries with a waxy bloom. Common holly (*Ilex aquifolium*) has simple, spiralling leaves. Fruits are round, red berries.

TAXONOMY:

Berberidaceae

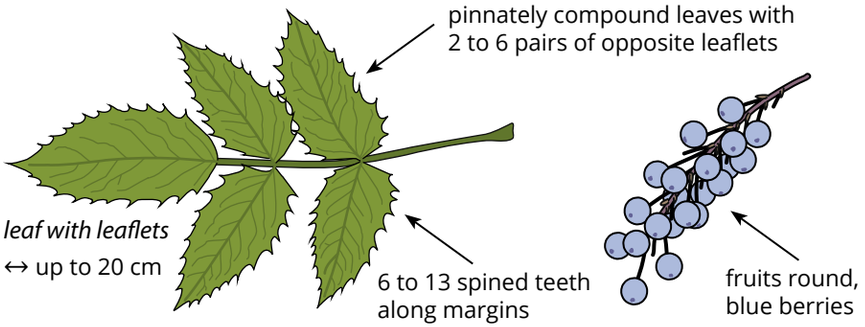
NATIVE RANGE:

eastern North America

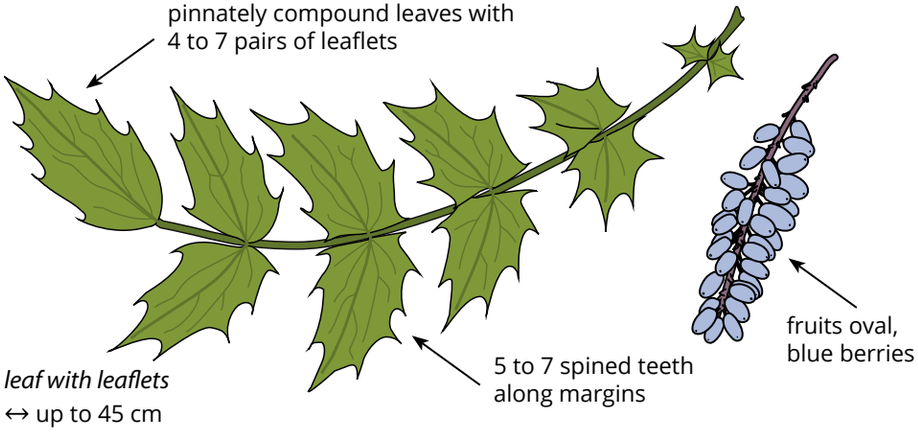
PATHWAYS:

horticulture

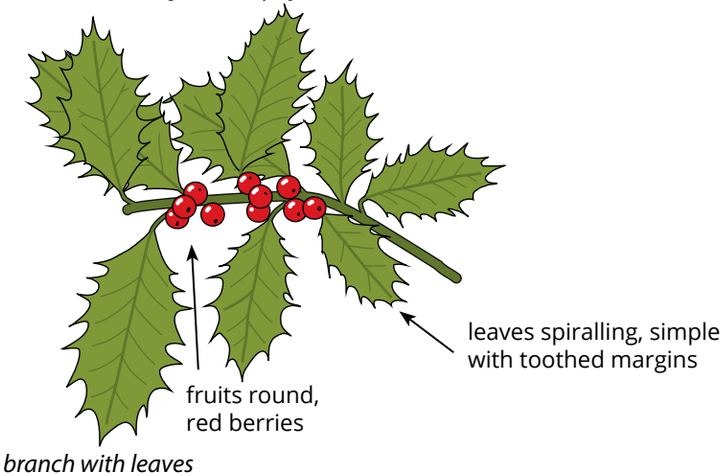
Oregon grape (*Berberis aquifolium*) AS



Leatherleaf mahonia (*Berberis bealei*) AS



Common holly (*Ilex aquifolium*) ES



Golden currant

Ribes aureum Pursh

Flowers

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 2–3 m

DESCRIPTION: A small to middle-sized deciduous, spineless shrub. Its leaves are 3- to 5-lobed with unbranched veins and a few coarse teeth near the tips of lobes. In autumn, leaves colour bright red. Flowers are yellow, tubular and borne in hanging, several cm long clusters which often emit a clove-like or vanilla-like scent. Fruits are hanging clusters of glossy, black (sometimes yellow to orange) round berries. The fruits are edible but astringent.

HABITAT: In its native range growing in forest edges, hedgerows and riparian habitats, sometimes also in montane meadows and deciduous forests.

STATUS: Locally naturalised throughout Europe. It is often cultivated for its edible fruits and autumn colours.

SIMILAR SPECIES: Gooseberry (*Ribes uva-crispa*), a European native which is often cultivated, has single to trifurcated spines at the nodes and white flowers. Fruits are over 1 cm wide, reddish to green berries. Alpine currant (*R. alpinum*) has greenish-yellow flowers and red berries. Leaves of Midland hawthorn (*Crataegus laevigata*) are less profoundly lobed, fruits are dark red pomes with visible remnants of the calyx, which contain nutlets.

TAXONOMY:

Grossulariaceae

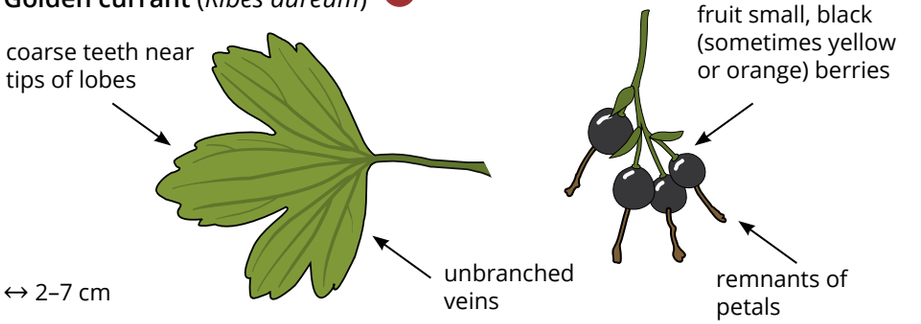
NATIVE RANGE:

North America,
North Mexico

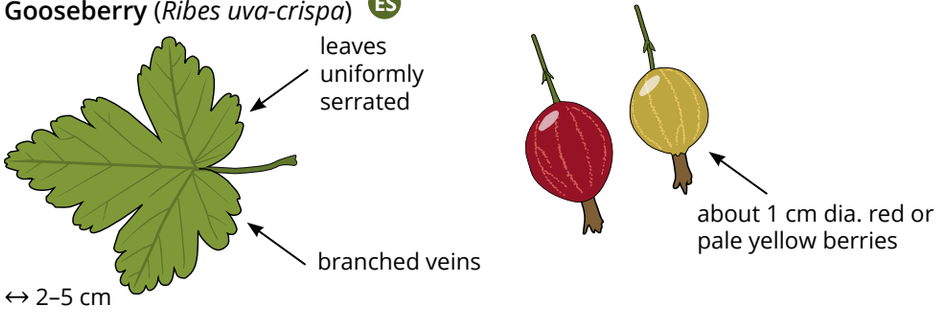
PATHWAYS:

horticulture,
edible crop

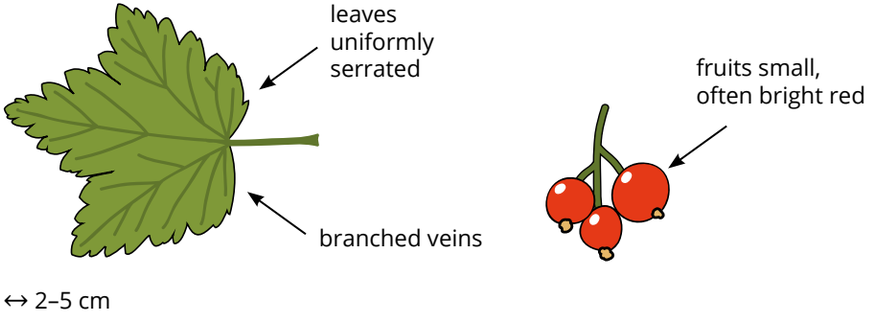
Golden currant (*Ribes aureum*) AS



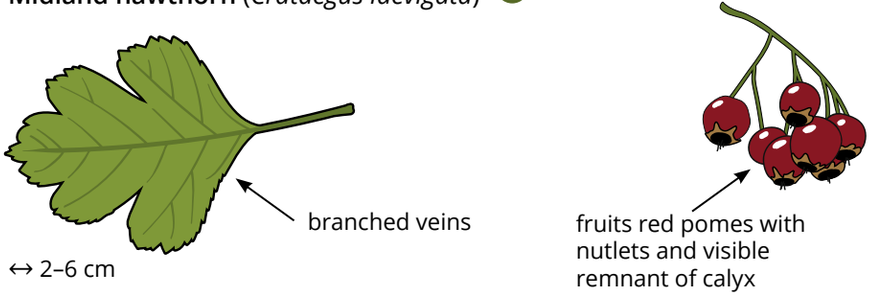
Gooseberry (*Ribes uva-crispa*) ES



Alpine currant (*Ribes alpinum*) ES



Midland hawthorn (*Crataegus laevigata*) ES



Cherry laurel

Prunus laurocerasus L.

Upright flower clusters

Unripe fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 8 m (rarely to 14 m)

DESCRIPTION: A dense, evergreen, multi-stemmed shrub or small tree. The smooth bark with lenticels of young shoots is green, later turning brownish-grey. Leaves are alternate, simple, oblong to obovate-oblong with an obtuse or sharply-pointed apex. Leaf margins are slightly serrate to entire. Leaves are leathery, shiny, dark green above, paler below. Flowers are small, white, and borne in long, upright clusters. Fruits are clusters of shiny black drupes with a diameter of about 1 cm.

HABITAT: Mainly in forests with slightly acidic soil. In Serbia, where it is native, it grows in beech forests.

STATUS: Occurring naturally in southeastern Europe (see the circle on the map). Commonly cultivated and seedlings are increasingly found in forests.

SIMILAR SPECIES: Portugal laurel (*Prunus lusitanica*), has smaller ovate leaves with an acute apex and dentate margins. Flowers are borne in arching clusters. The bark of young shoots is red. Bay laurel (*Laurus nobilis*) has leaves with entire, but wavy margins. Flowers are yellow-green, 1 cm across, borne paired in leaf axils. Leaves of Chinese privet (*Ligustrum lucidum*) are placed opposite and have entire leaf margins.

TAXONOMY:

Rosaceae

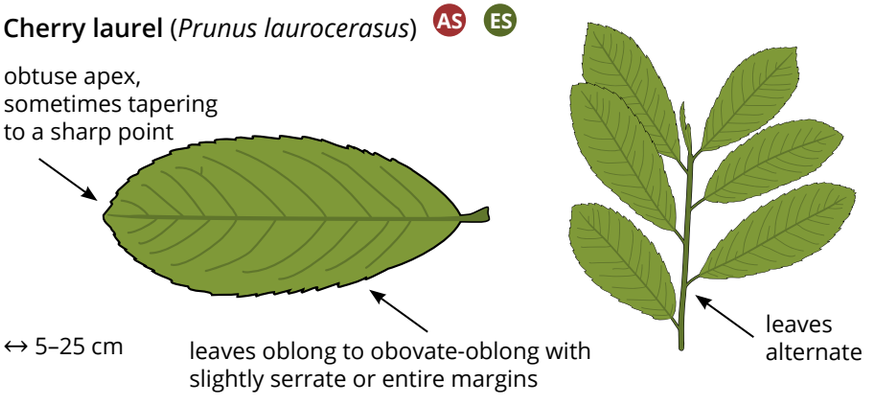
NATIVE RANGE:

Southeast Europe, Turkey (marked with a cricle on the map)

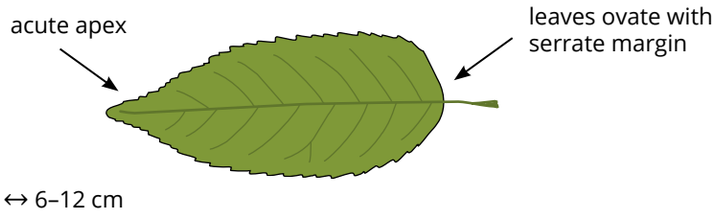
PATHWAYS:

horticulture

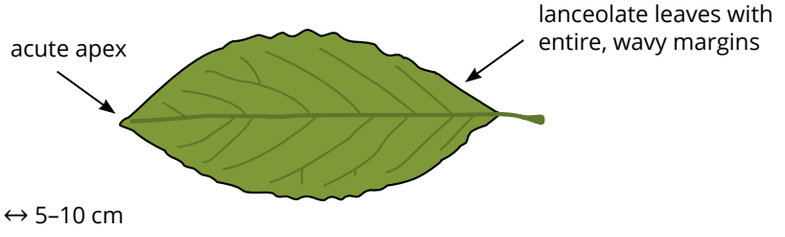
Cherry laurel (*Prunus laurocerasus*) AS ES



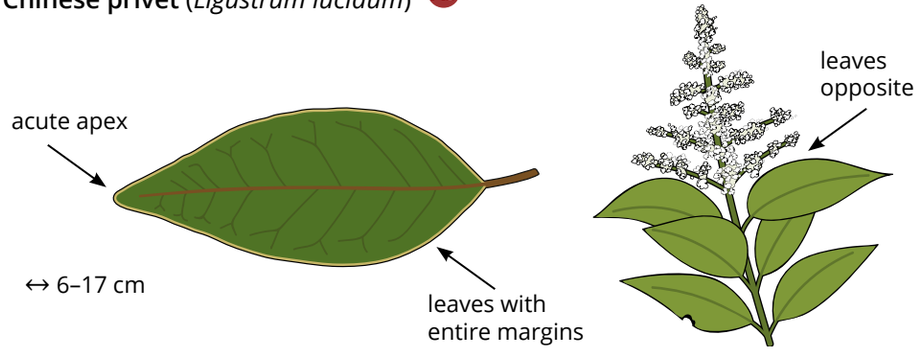
Portugal laurel (*Prunus lusitanica*) AS ES



Bay laurel (*Laurus nobilis*) ES



Chinese privet (*Ligustrum lucidum*) AS



Wine raspberry

Rubus phoenicolasius Maxim.

Hairs and prickles on stems

Red drupes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–3 m

DESCRIPTION: A shrub with long, arching branches, which may form dense thickets. Its stems are covered in red glandular hairs and thorns. Leaves are palmately compound with 3 to 5 leaflets. They are covered with hairs, green above and grey below. Flowers develop on last-years branches, which have smaller leaves with only three lobes. The sepals are covered with hairs and are much longer than petals (the flower appears partially closed). Fruits are red drupelets, clustered in an aggregated fruit. Unripe fruits are enclosed in the sepals.

HABITAT: Moist open areas, including forest margins, open forests, roadsides, fields and ruderal habitats.

STATUS: Unclear, possibly under-recorded in some countries because of its similarity with other blackberries. Most observations are from the United Kingdom and the Netherlands.

SIMILAR SPECIES: Most similar of the European raspberries is the common blackberry (*Rubus hirtus* agg.). Its branches may be covered with many hairs and thorns, but the underside of leaves is usually green. Petals are about as long as sepals. Ripe drupelets are black.

TAXONOMY:

Rosaceae

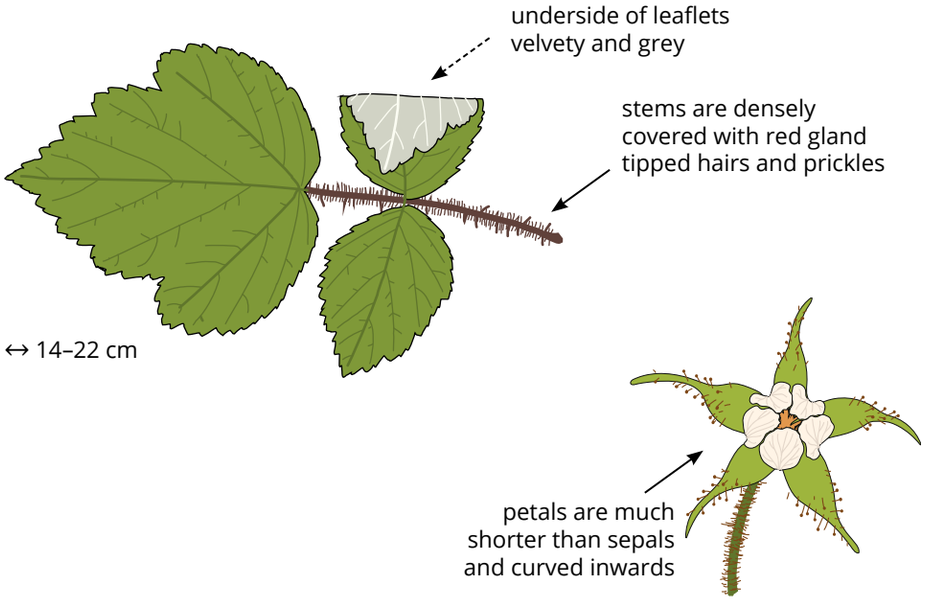
NATIVE RANGE:

Eastern Asia

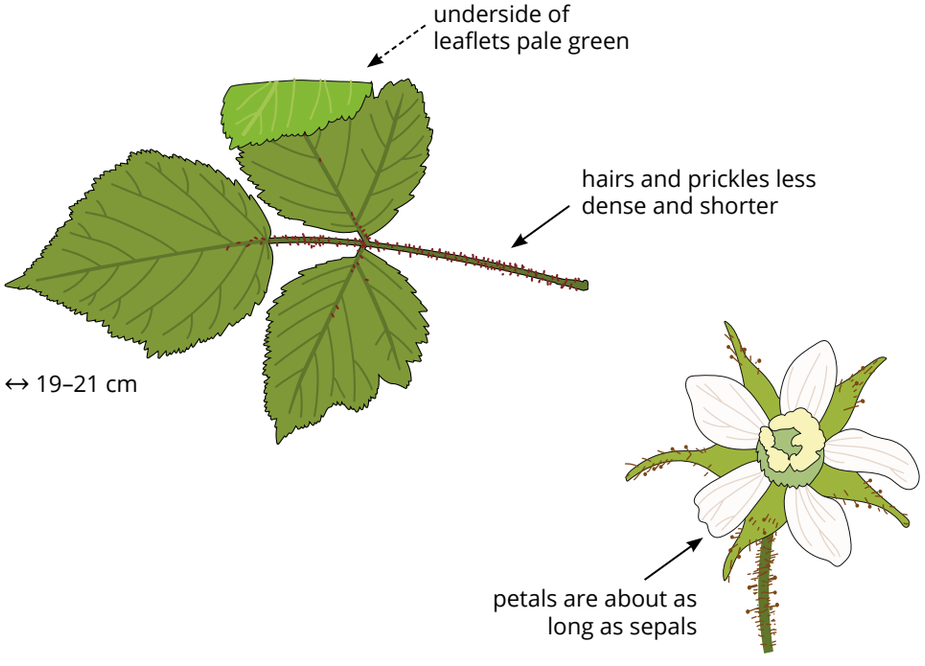
PATHWAYS:

horticulture, crop plant

Wine raspberry (*Rubus phoenicolasius*) AS



Common blackberry (*Rubus hirtus* agg.) ES



Japanese spiraea

Spiraea japonica L. f.

Flat-topped inflorescence

Twigs brown to reddish brown

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–2 m

DESCRIPTION: A deciduous shrub with multiple upright stems. Twigs brown to reddish-brown, sometimes with fine hairs. Leaves are alternate, simple and narrow-lanceolate. Leaf-margins are toothed near the apex but entire towards the base. Leaves are green above, paler below, in some cultivars yellowish or reddish. Flowers are small, usually pink, flat-topped terminal clusters, with a diameter of at least 5 cm. Highly variable due to many cultivated varieties.

HABITAT: Forests, forest clearings, ruderal habitats and a variety of wetlands, including riparian forests.

STATUS: Widespread; most observations from Sweden and the United Kingdom. Also widely planted and one of the most common shrubs in urban green areas.

SIMILAR SPECIES: Other *Spiraea*-species have erect clusters of flowers. They can also be distinguished by the shape of leaves, leaf margins and hairiness (see details on the facing page). Some hybrids may have intermediate characteristics. From a distance, hemp agrimony (*Eupatoria cannabina*) may appear similar, but has palmately compound, opposite leaves.

TAXONOMY:

Rosaceae

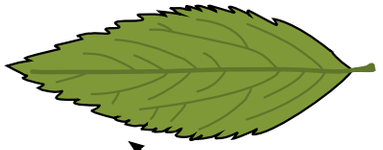
NATIVE RANGE:

eastern Asia

PATHWAYS:

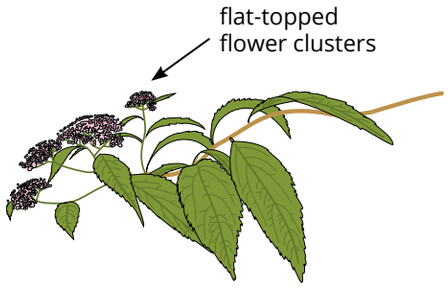
horticulture

Japanese spiraea (*Spiraea japonica*) AS

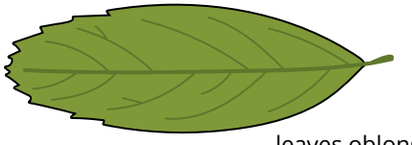


↔ 3–8 cm

upper 3/4 of leaf margin serrate, apex acuminate



Douglas spiraea (*Spiraea douglasii*)
and the very similar **Billard's spiraea** (*Spiraea* x *billardii*) AS

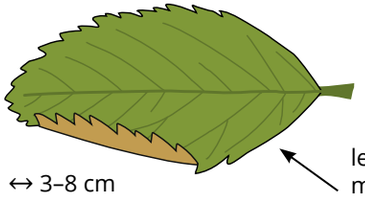


↔ 4–8 cm

leaves oblong, upper 1/2 of leaf margin serrate, apex obtuse, underside grey or white

other alien spiraeas and the native bridewort (*S. salicifolia*) have upright clusters of flowers

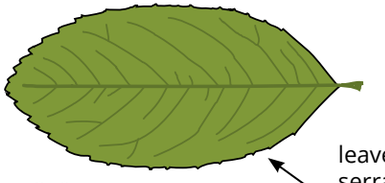
Steeplebush (*Spiraea tomentosa*) AS



↔ 3–8 cm

leaves ovate, upper 2/3 of leaf margin serrate, apex obtuse, underside pubescent and yellowish

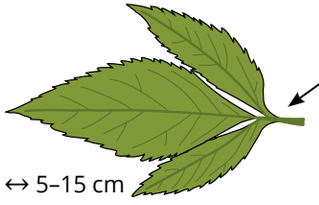
Bridewort (*Spiraea salicifolia*) ES



↔ 3–8 cm

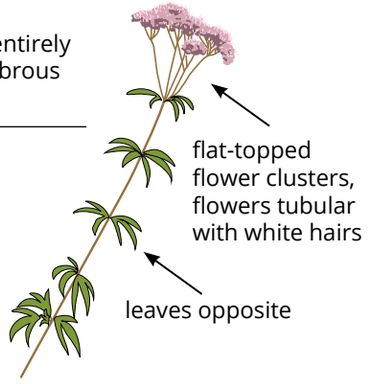
leaves ovate, margin entirely serrate, underside glabrous and green

Hemp agrimony (*Eupatoria cannabina*) ES



↔ 5–15 cm

leaves palmately compound with 3 to 5 lanceolate lobes



Common ninebark

Physocarpus opulifolius (L.) Maxim.

Bark shedding in strips

A cultivar with red leaves

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 1–3 m

DESCRIPTION: A large, branched, deciduous shrub. The bark on young branches is smooth and brownish-yellow, greyish-brown and shedding in long strips on older branches. Its alternate leaves are simple and palmately compound with 3 to 5 lobes with serrated margins. Leaves are dark green above, slightly paler below, in cultivated forms also red or yellowish-green. Flowers are white, about 1 cm across, borne in dense hemispherical clusters. Each of the five pistils develops into a small pointed follicle, which contains many seeds. Follicles, borne in dense hemispherical clusters, are initially green to yellowish-brown, turning red when ripe.

HABITAT: Grows in stony and sandy soils, often on gravel and river banks.

STATUS: Occurs locally throughout Europe; possibly under-reported because of its similarity to native shrubs.

SIMILAR SPECIES: Guelder rose (*Viburnum opulus*), hawthorns (*Crataegus* spp.) and currants (*Ribes* spp.) all have similarly shaped leaves. Guelder rose has opposite leaves, fruits are bright red, fleshy berries. Leaves of currants are usually smaller and have finely serrated leaf margins. Fruits are round, black or red berries.

TAXONOMY:

Rosaceae

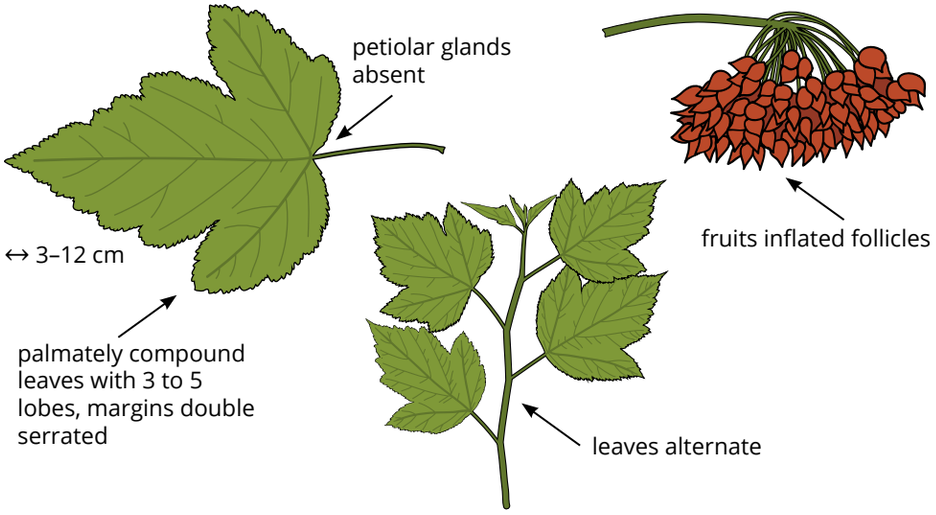
NATIVE RANGE:

eastern North America

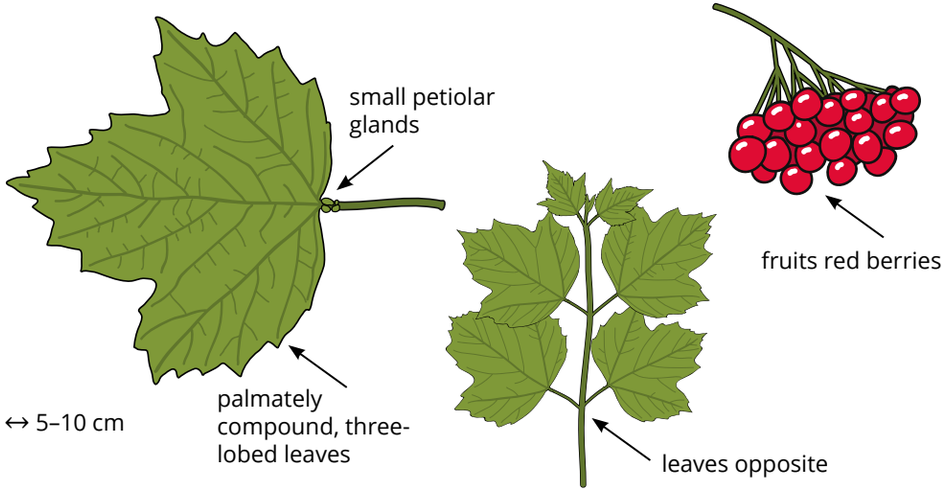
PATHWAYS:

horticulture

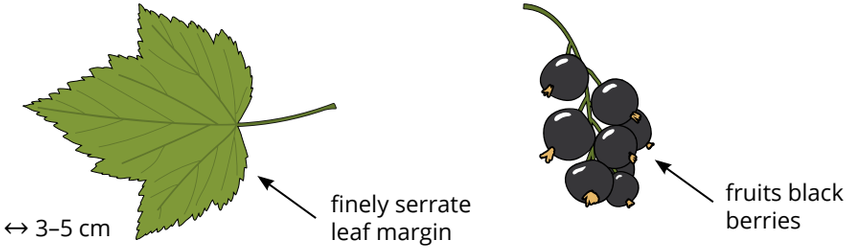
Common ninebark (*Physocarpus opulifolius*) AS



Guelder rose (*Viburnum opulus*) ES



Blackcurrant (*Ribes nigrum*) ES



Multiflora rose

Rosa multiflora Thunb.

Curved thorns

Comb-like stipules

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–3 m (rarely up to 4 m)

DESCRIPTION: A medium-sized shrub with arching stems which may climbing on other woody plants. Branches are covered with curved, often paired spines. Leaves are pinnately compound with 5-11 lanceolate leaflets which are dark green above and greyish-green below and characteristic, comb-like stipules at the base of the petiole. Its small (2-3 cm across), white to light pink flowers are borne in clusters of 10 to 30. Fruits are about 5 mm wide, round hips. They are initially green, turning dark to purple red and persist until the following spring.

HABITAT: Forest edges and open forests, hedges and riverbanks.

STATUS: Unclear because garden roses are frequently reported under the name "multiflora rose". These may or may not be hybrids with *R. multiflora*.

SIMILAR SPECIES: There are many native rose species in Europe, but none of them has comb-like stipules at the bases of leaves. Evergreen rose (*Rosa sempervirens*) has white flowers in smaller clusters, but the individual flowers are much larger (2–5 cm across).

TAXONOMY:

Rosaceae

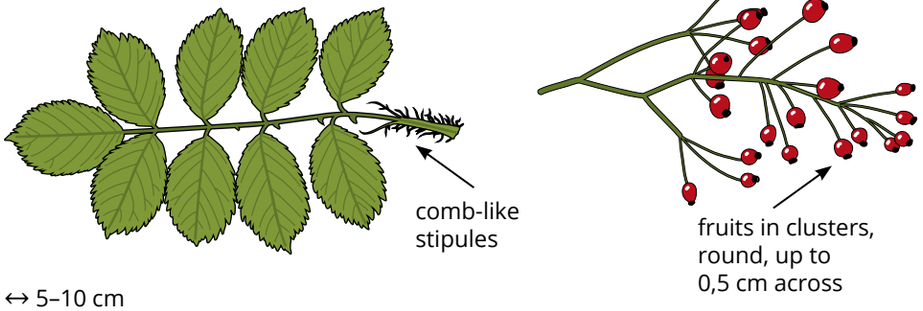
NATIVE RANGE:

East Asia

PATHWAYS:

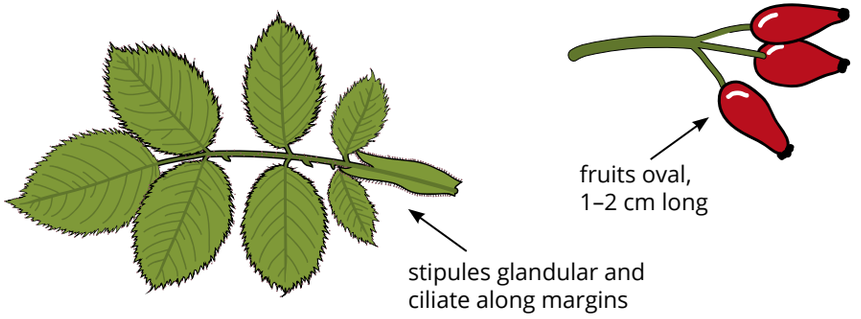
horticulture

Multiflora rose (*Rosa multiflora*) AS



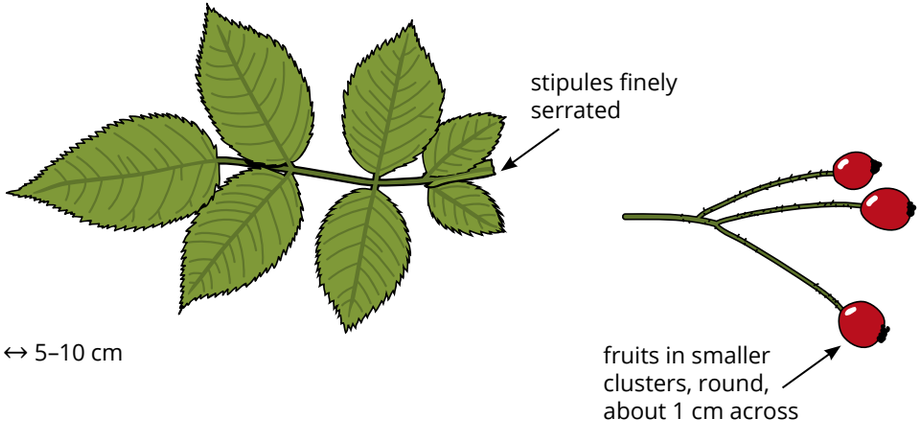
↔ 5–10 cm

Dog rose (*Rosa canina*) ES



↔ 5–10 cm

Evergreen rose (*Rosa sempervirens*) ES



↔ 5–10 cm

Juneberry

Amelanchier lamarckii F. G. Schroed.

Flowers

Drupes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ up to 12 m

DESCRIPTION: A deciduous shrub or a small tree. Young twigs are hairy. Leaves alternate, elliptic to oblong, finely serrated (6–12 teeth per cm), glabrous, purplish when young, turning yellow to orange-red in autumn. The inflorescence is a terminal, multi-flowered drooping raceme. Lower lower pedicels are clearly longer than the upper ones. Flowers are dioecious, actinomorphic, 12–28 mm in diameter, with five triangular sepals and five lanceolate petals. Styles are fused for 2/3 of their length. Fruit a juicy drupe, turning purplish-red.

HABITAT: Sandy acidic soils, especially in heathlands, open woodlands, along forest edges and in urban areas.

STATUS: Common in the Netherlands, Luxembourg, northwest Denmark, Belgium and parts of the United Kingdom.

SIMILAR SPECIES: American low juneberry (*Amelanchier spicata*) has an erect inflorescence and petals which are obovate and smaller (4–10 mm). Young leaves olive green; lacks conspicuous autumn colour. Snowy mespilus (*A. ovalis*), which is native in South and Central Europe, has coarsely serrate leaves with a pubescent underside, and flowers with free styles.

TAXONOMY:

Rosaceae

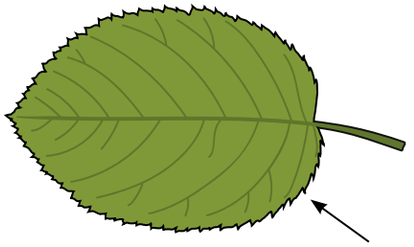
NATIVE RANGE:

North America

PATHWAYS:

horticulture

Juneberry (*Amelanchier lamarckii*) AS

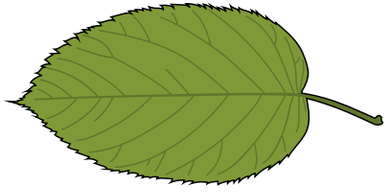


leaves elliptic to oblong, with finely serrated margins

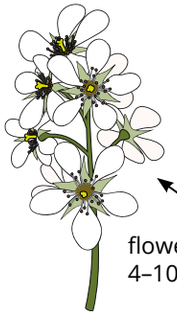
↔ 3–7 cm

flowers drooping, 12–28 mm across

Low juneberry (*Amelanchier spicata*) AS



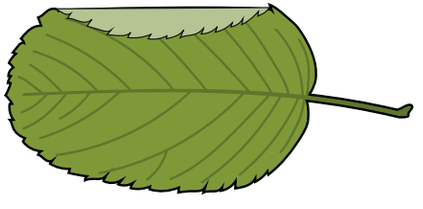
↔ 1.5–6.5 cm



flowers upright, 4–10 mm across

Snowy mespilus (*Amelanchier ovalis*) ES

pubescent underside of leaves



↔ 2–4 cm

Purple chokeberry

Aronia x *prunifolia* (Marshall) Rehder

Flowers with pink stamens

Midrib with brown glands

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ up to 2 m

DESCRIPTION: A deciduous, suckering shrub with alternate, simple, obovate-elliptic leaves with finely serrated margins with glandular tips. The upper leaf mid-vein has tiny brown glands. The leaves are dark green above, paler and moderately pubescent below and turn turning wine red in autumn. Flowers are monoecious, with 5 glandular sepals and 5 white petals and 5 styles, which are fused at the base. They are placed in clusters of 10 to 20. The fruit is a globose to ellipsoid pome, initially red, turning dark purplish when ripe.

HABITAT: Deciduous, coniferous and mixed forests, forest margins, marshlands and urban areas.

STATUS: Commonly cultivated for its edible fruits. Increasingly found in Western and Northern Europe.

SIMILAR SPECIES: Cherryberries (genus *Prunus*) do not have glands on the midrib but instead extrafloral nectaries on leaf petioles and only a single style in each flower. Red chokeberry (*A. arbutifolia*) has pillose undersides of leaves and red pomes. Black chokeberry (*A. melanocarpa*) has glabrous undersides of leaves and black pomes. Plants in horticulture often show intermediate characters between the *Aronia*-species.

TAXONOMY:

Rosaceae

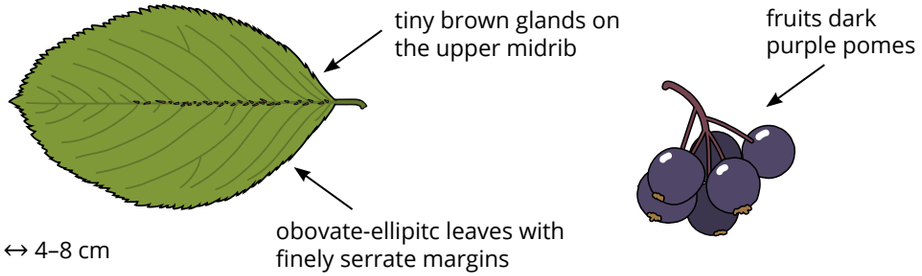
NATIVE RANGE:

North America

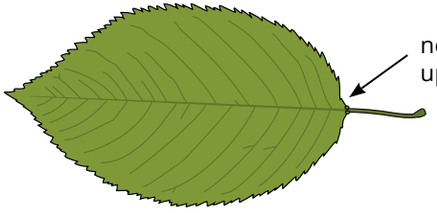
PATHWAYS:

horticulture,
crop plant

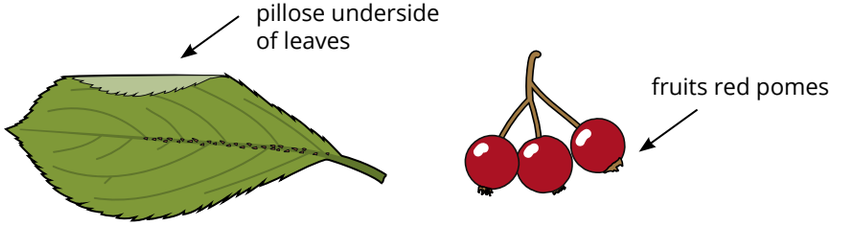
Purple chokeberry (*Aronia* x *prunifolia*) AS



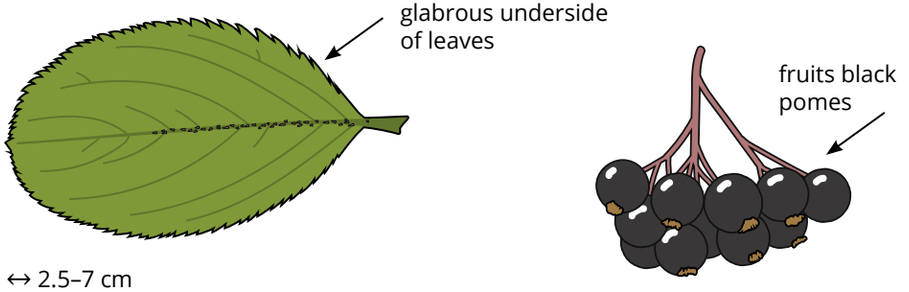
Cherryberries (*Prunus* spp.) AS ES



Red chokeberry (*Aronia arbutifolia*) AS



Black chokeberry (*Aronia melanocarpa*) AS



Wall cotoneaster

Cotoneaster horizontalis Decaisne

Flowers

Herringbone branching

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 70 cm

DESCRIPTION: A low, semi-deciduous or evergreen, spineless bush with arching and trailing branches. Stiff, regular side-branches create a herringbone pattern. Leaves are small (1–1.5 cm), leathery and glabrous, alternate, broadly ovate with an acute leaf apex and entire margins. The flowers are small, with five white to pink petals, borne singly on very short stalks in leaf axils. Fruits are red, berry-like pomes, 5–7 mm wide, containing 1 to 3 (up to 5) nutlets.

HABITAT: Most successful in sunny sites or semi-shade, on dry, stony, gravelly or sandy soils.

STATUS: a common ornamental plant throughout Europe. Spontaneous occurrences in scrub and heathland.

SIMILAR SPECIES: Several other cotoneaster-species have small, ovate leaves and orange to red fruits. Of these, cranberry cotoneaster (*C. apiculatus*) may be distinguished by its thinner, papery, deciduous leaves, and fewer side-branches. Diel's cotoneaster (*C. dielsianus*), also deciduous, has shorter side-branches which do not grow in a herringbone pattern, while the inflorescences have 2–5 flowers. Many other cotoneaster species have larger leaves. The unrelated Wilson's honeysuckle (*Lonicera nitida*) has opposite leaves.

TAXONOMY:

Rosaceae

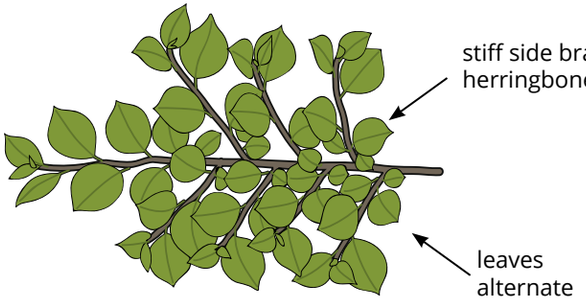
NATIVE RANGE:

East Asia

PATHWAYS:

horticulture

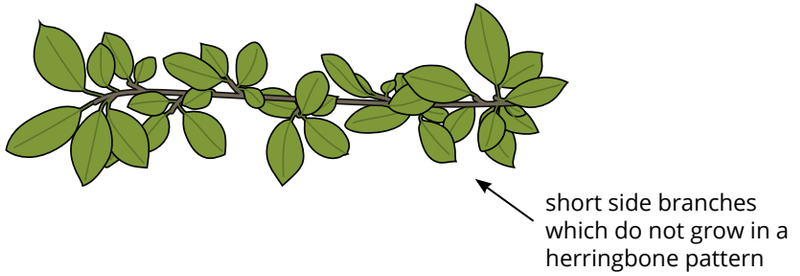
Wall cotoneaster (*Cotoneaster horizontalis*) AS



branch with leaves

↔ leaves 1–1.5 cm

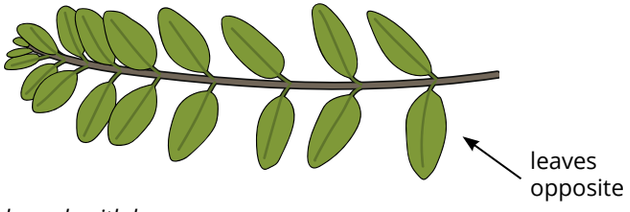
Diel's cotoneaster (*Cotoneaster dielsianus*) AS



branch with leaves

↔ leaves 1–2 cm

Wilson's honeysuckle (*Lonicera nitida*) AS



branch with leaves

↔ leaves 1.2–1.4 cm

False indigo

IAP

Amorpha fruticosa L.

Pores on leaflets

No spines

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 1–4 m

DESCRIPTION: A deciduous shrub with multiple stems. Leaves are alternate, pinnately compound with one terminal leaflet and 5 to 17 pairs of elliptical leaflets. Leaflets have small pores which are visible when the leaflet is viewed against the sun. Slender stipules are present with young leaves but there are no spines. The purple-blue flowers with yellow anthers are borne on slender, 5–15 cm long spikes at the end of twigs. Fruits are spotted pods about 1 cm long, initially bright green, turning brown when dry.

HABITAT: Riparian habitats, forest edges, coastal areas and ruderal sites in lowland.

STATUS: Widespread throughout Europe. Sometimes planted for honeybees and as an ornamental shrub.

SIMILAR SPECIES: Black locust (*Robinia pseudoacacia*), has very similar leaves but has spines at each leaf scar (often absent on older or slow-growing twigs). Leaflets have no pores. Flowers are white, borne in long hanging clusters. Fruits are flattened, hanging pods, up to 10 cm long containing 4 to 8 seeds.

TAXONOMY:

Fabaceae

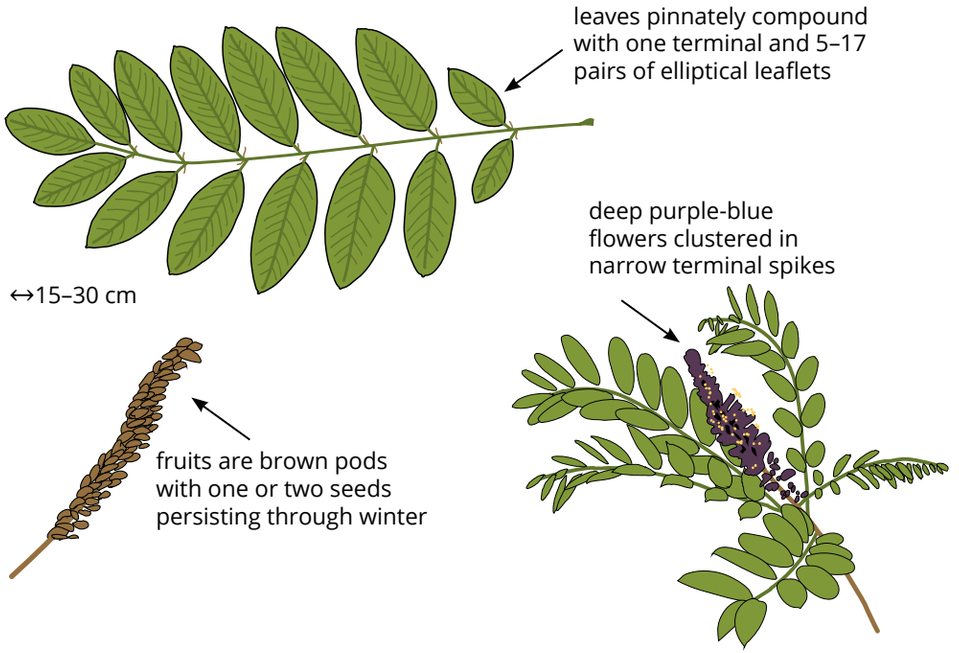
NATIVE RANGE:

North America

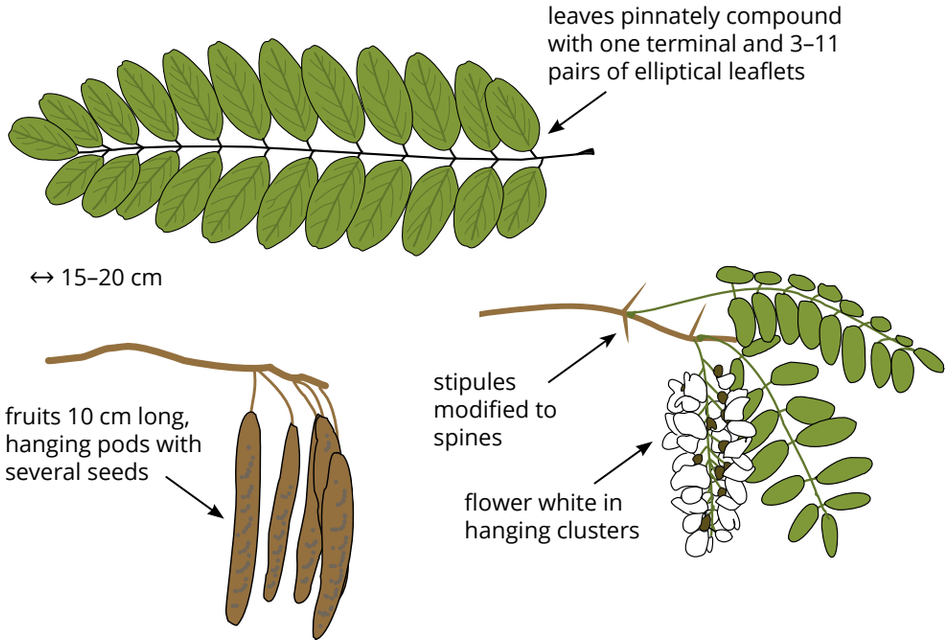
PATHWAYS:

horticulture, honeybee plant

False indigo (*Amorpha fruticosa*) AS



Black locust (*Robinia pseudoacacia*) AS



Thorny olive

Elaeagnus pungens Thunb.

Underside of leaf

Thorns on branches

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 7 m

DESCRIPTION: An evergreen shrub or a small tree, sometimes a scrambling climber, quickly growing thickly over nearby shrubs and trees. Twigs often bearing thorns, 5–8 cm long. Leaves alternate, simple, thick, oval to lanceolate. Shiny green above, covered below with minute silvery and brown scales. Flowers pale yellow to white, bell-shaped, lacking petals, appearing in late autumn. Fruits, an oval berry-like achene, 1.5 cm long, red with silvery scales, containing one seed.

HABITAT: In its natural range it grows on open slopes in thickets and along roadsides, often near the sea.

STATUS: Only a few records throughout Europe.

SIMILAR SPECIES: Russian olive (*Elaeagnus angustifolia*) has narrower, linear or lanceolate leaves with longer petioles. The underside of leaves is silvery grey but without brown spots. Trunk, buds and leaves are covered with tiny silvery-brown scales. Bay laurel (*Laurus nobilis*) has similarly thick, evergreen leaves, which are elliptical to lanceolate, green on both sides and have undulating margins.

TAXONOMY:

Elaeagnaceae

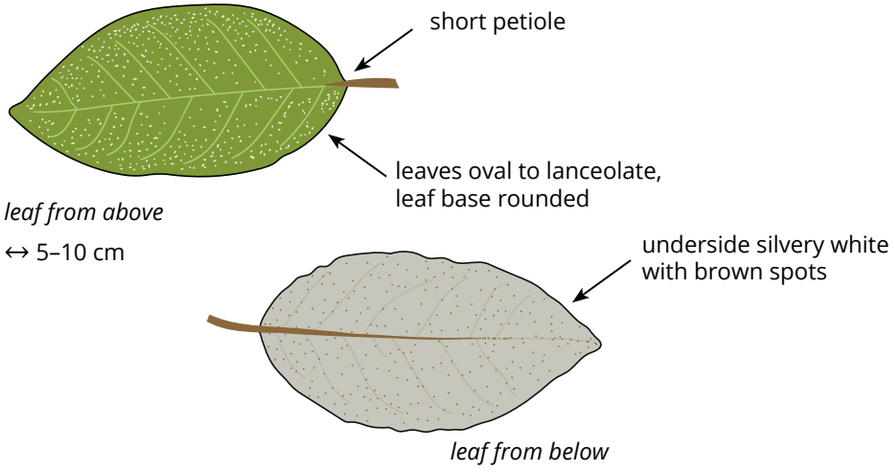
NATIVE RANGE:

East Asia

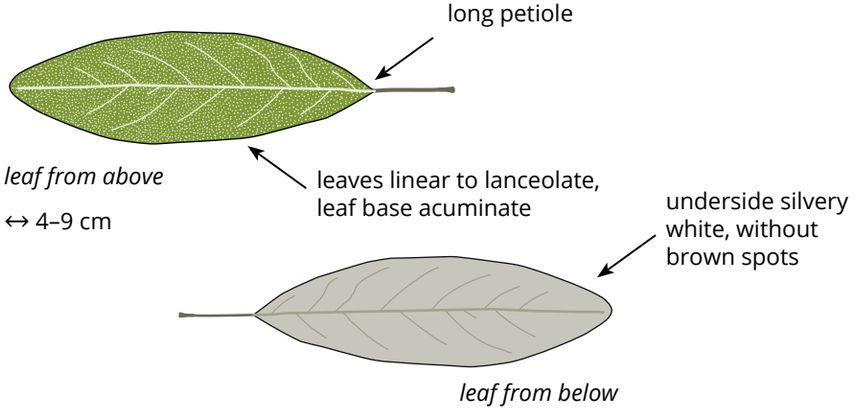
PATHWAYS:

horticulture

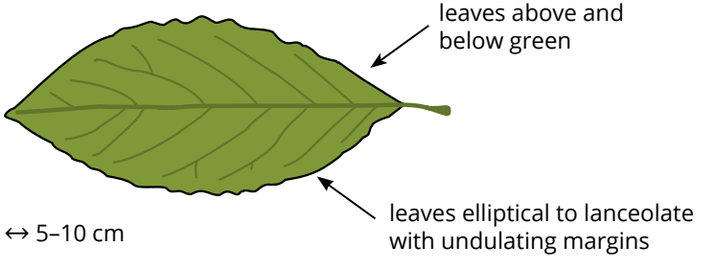
Thorny olive (*Elaeagnus pungens*) AS



Russian olive (*Elaeagnus angustifolia*) AS



Bay laurel (*Laurus nobilis*) ES



Red osier dogwood

IAP

Cornus sericea L.

Cluster of flowers

White drupes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 2–4 m

DESCRIPTION: A deciduous bush with numerous smooth-barked stems. The bark is shiny, dark red with many lenticels on young branches (rarely yellow or brown). Later, the bark turns light brown, and develops cracks and splits. Leaves are opposite, oval to lanceolate, green above and grey to greyish-green below. Flowers small, with four white petals, borne in flat-topped clusters, 5–8 cm across. Fruits are white or pale grey drupes, round, 7–9 mm in dia., each containing one seed.

HABITAT: Preference for nutrient-rich, moist soil in riparian forests, where it is tolerant of periodical flooding, ruderal sites. Also in meadows where it is grazed, but persists as a low-growing bush.

STATUS: Widespread throughout Europe, also commonly planted in gardens and urban green spaces.

SIMILAR SPECIES: In common dogwood (*Cornus sanguinea*) twigs are red or green but have no lenticels. The underside of leaves is green. They colour dark red in autumn. The fruit is a small dark blue or black drupe. Cornelian cherry dogwood (*Cornus mas*) has year-round green twigs. Fruit is an elongated, bright red drupe.

TAXONOMY:

Cornaceae

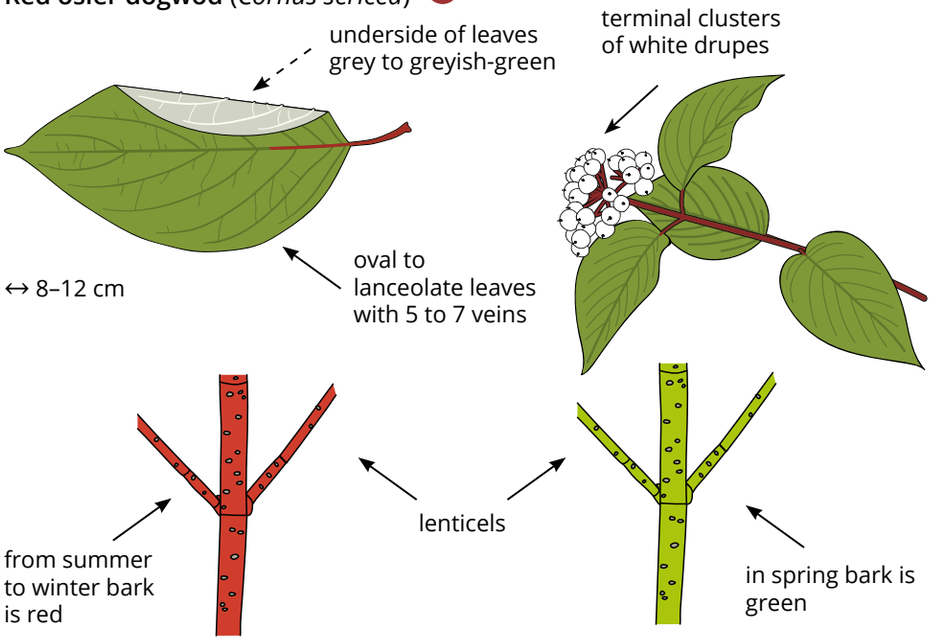
NATIVE RANGE:

eastern North America

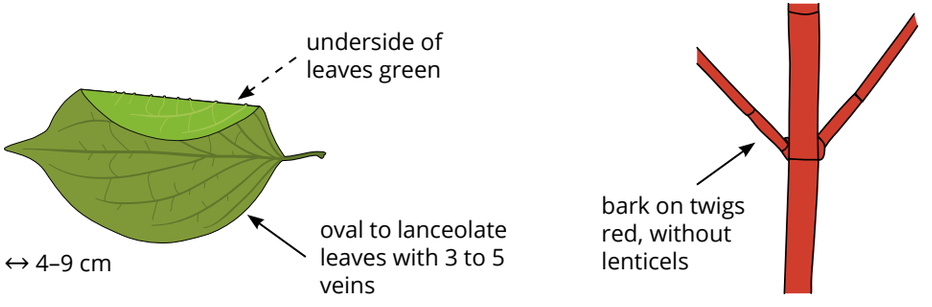
PATHWAYS:

horticulture

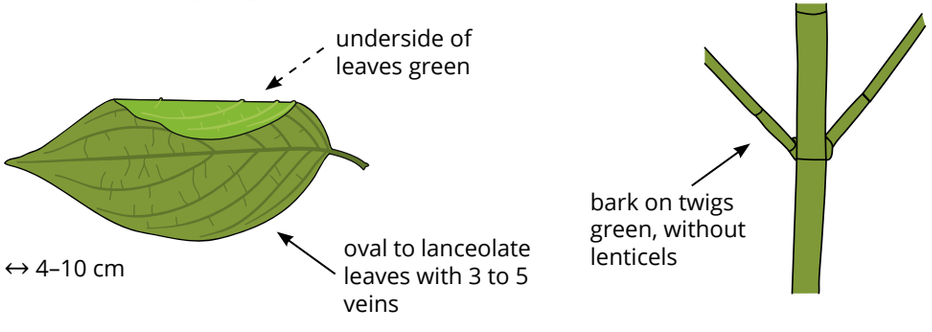
Red osier dogwod (*Cornus sericea*) AS



Common dogwood (*Cornus sanguinea*) ES



Cornelian cherry dogwood (*Cornus mas*) ES



Fuzzy deutzia

Deutzia scabra Thunb.

A cultivated form

Crenate margins with tiny spines

↥ 2–3 m

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A deciduous shrub with arching branches and a rounded crown. Bark on young branches red-brown to green, scabrous, on older branches brown and scaly. Leaves are opposite, simple, oval to ovate-lanceolate, with a slightly acuminate apex, leaf-margins are crenate with tiny coarse spines. Leaves are light green, pubescent on both sides, feeling rough. The white to light pink, clustered flowers have five petals (more in "double" cultivars) and measure 1 cm across. Fruits are dry brown capsules which persist on branches until spring.

HABITAT: Within native range grows along forest edges and in clearings. Often naturalised on rocky soils along streams.

STATUS: Often planted in parks, gardens and hedgerows. Locally naturalised in West and Central Europe and can be invasive.

SIMILAR SPECIES: Slender deutzia (*D. gracilis*) is very similar but lower and its leaves do not feel rough. European mock orange (*Philadelphus coronarius*) has larger flowers which have only four petals (may be double in some cultivars). Leaves are prominently acuminate.

TAXONOMY:

Hydrangeaceae

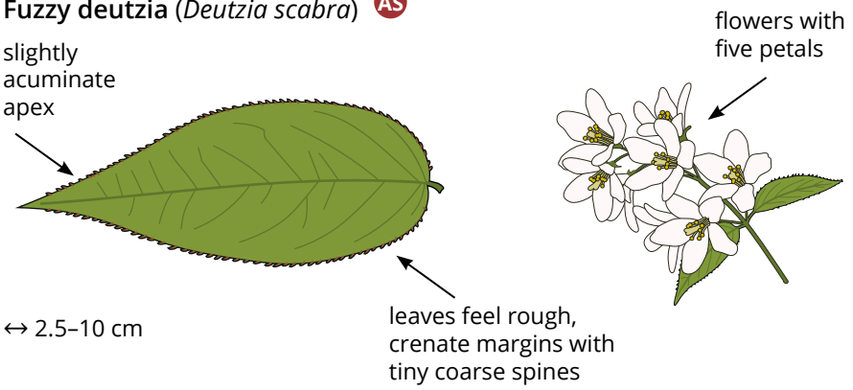
NATIVE RANGE:

East Asia (Japan, China)

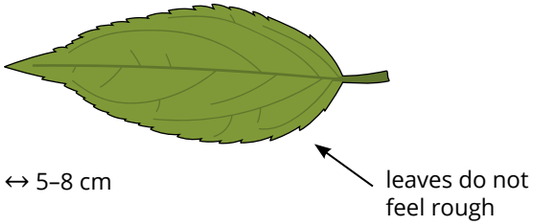
PATHWAYS:

horticulture

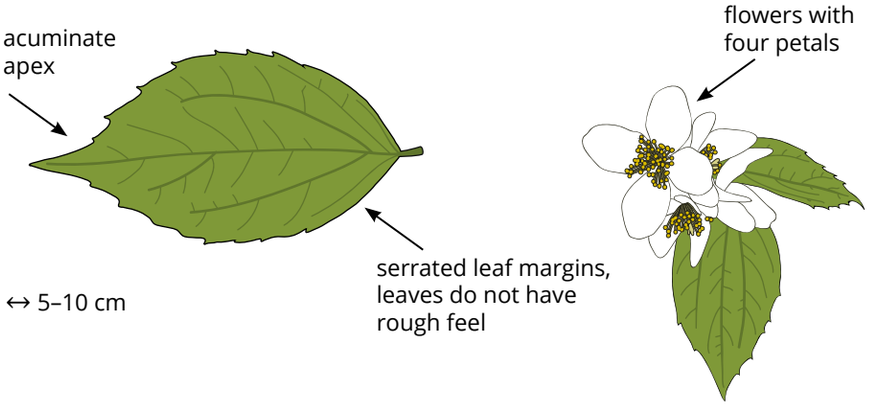
Fuzzy deutzia (*Deutzia scabra*) AS



Slender deutzia (*Deutzia gracilis*) AS



European mock orange (*Philadelphus coronarius*) AS



Amur honeysuckle

Lonicera maackii (Rupr.) Maxim.

Flowers

Cluster of berries

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ up to 6 m

DESCRIPTION: A tall, multi-stemmed deciduous shrub with arching branches. Leaves are opposite, simple, ovate, and have an entire margin and an acuminate apex. Leaves are green above, paler and slightly fuzzy below. Flowers 2.5 cm wide, 4 upper petals fused, initially white, turning yellow with age. Flowers appear in pairs, often with several pairs in small clusters. Fruits are small red berries, on short stalks, which appear in clusters but berries are not fused.

HABITAT: Open forests, riparian forests and ruderal sites.

STATUS: Few observations throughout Europe. Commonly planted gardens and urban green spaces.

SIMILAR SPECIES: Tatarian honeysuckle (*Lonicera tatarica*): shrub up to 3 metres tall, originating from Siberia and Eastern Asia. Flowers are pale to bright pink. Fruits are red berries with clearly visible stalks. Fly honeysuckle (*Lonicera xylosteum*) has fuzzy leaves and twigs. Leaves are obovate to elliptic, greyish-green. Flowers are small, initially white, later turning yellow. Fruits are double red berries which are attached with a single stalk and fused at the base.

TAXONOMY:

Caprifoliaceae

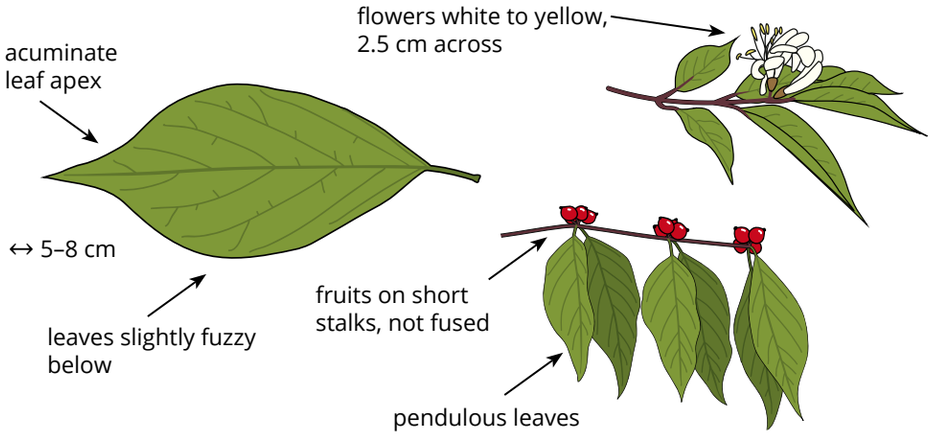
NATIVE RANGE:

East Asia

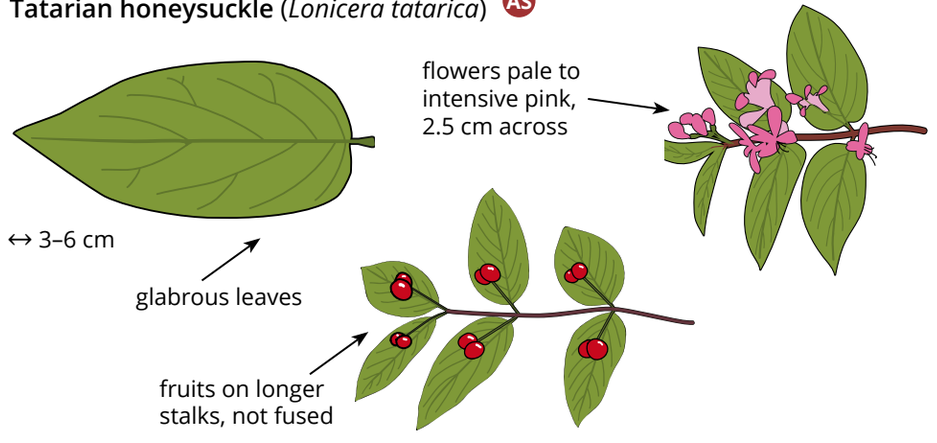
PATHWAYS:

horticulture

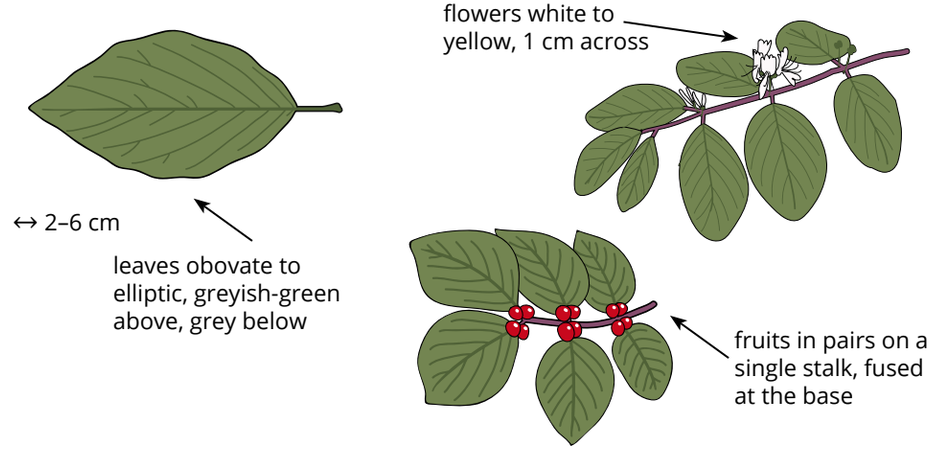
Amur honeysuckle (*Lonicera maackii*) AS



Tatarian honeysuckle (*Lonicera tatarica*) AS



Fly honeysuckle (*Lonicera xylosteum*) ES



Snowberry

Symphoricarpos albus (L.) S.F. Blake

Bell-shaped flowers

White drupes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 1–2 m

DESCRIPTION: Medium-sized deciduous shrub with erect, branches with a hollow pith. Leaves opposite, oval but with variable, entire to lobed margins. Leaves are green above, greyish-green below with small hairs at least on veins. Flowers small, pinkish-white, bell-shaped, borne in terminal clusters. Most easily distinguished by the fruits, which are round, white, berry-like drupes, about 1 cm in diameter. They develop from the end of summer till autumn and persist throughout winter.

HABITAT: Forest, woodlands, forest margins, floodplains and riverbanks on a variety of soils.

STATUS: The species is locally naturalized throughout Europe as a result of its long history as garden and hedging plant.

SIMILAR SPECIES: Coralberry (*Symphoricarpos orbiculatus*) does not have hollow twigs, its flowers are greenish to purple and its drupes are red to purple. Hybrid coralberry *Symphoricarpos* x *chenaultii* is usually lower and has intensely pink berries. Snowmound (*Spiraea nipponica*) has similarly shaped leaves, but these are placed alternate. Red-osier dogwood (*Cornus sericea*) has white berries but larger leaves and reddish bark.

TAXONOMY:

Caprifoliaceae

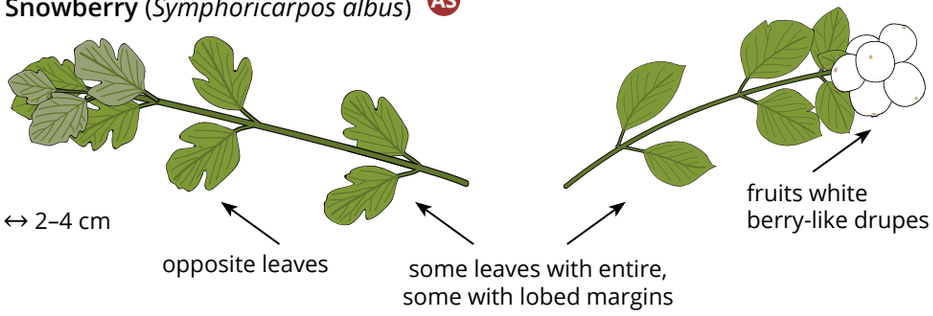
NATVE RANGE:

North America

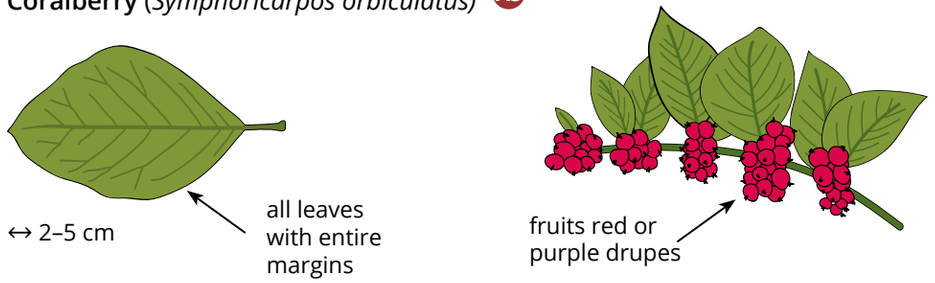
PATHWAYS:

horticulture

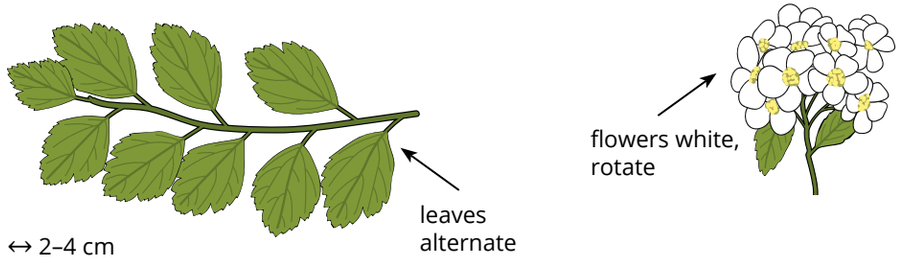
Snowberry (*Symphoricarpos albus*) AS



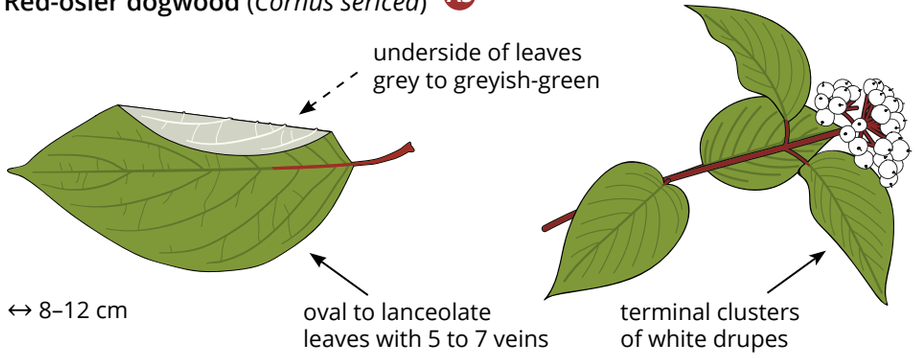
Coralberry (*Symphoricarpos orbiculatus*) AS



Snowmound (*Spiraea nipponica*) AS



Red-osier dogwood (*Cornus sericea*) AS



Chinese privet

Ligustrum lucidum W.T. Ait.

Fruits

Light leaf margin

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 8–14 m

DESCRIPTION: An evergreen shrub or a multi-stemmed tree. Branches are glabrous with numerous lenticels. Leaves opposite, simple, ovate to lanceolate with acuminate apex. Leaves are stiff, lustrous, dark green above with a narrow yellowish margin, 6 to 8 pairs of lighter green veins and a lighter green underside. Leaf petioles are often reddish tinged, 1–2 cm long. Flowers, small with white tubular corolla, borne in dense erect clusters. Fruits oval or round, blue-black drupes, usually containing two seeds. Fruits persist throughout winter.

HABITAT: Grows in dry and moist forests, on forest edges, but also in open areas and along rivers.

STATUS: A common ornamental plant. In some places naturalised and probably spreading.

SIMILAR SPECIES: Japanese privet (*Ligustrum japonicum*) is very similar, but has smaller leaves with 4 to 6 pairs of indistinct veins. Leaves feel thinner and do not have yellowish margins. Petioles are green, 0.6–1.2 cm long. Cherry laurel (*Prunus laurocerasus*) also has shiny evergreen leaves, but these are alternate, have an obtuse apex and often a serrated margin.

TAXONOMY:

Oleaceae

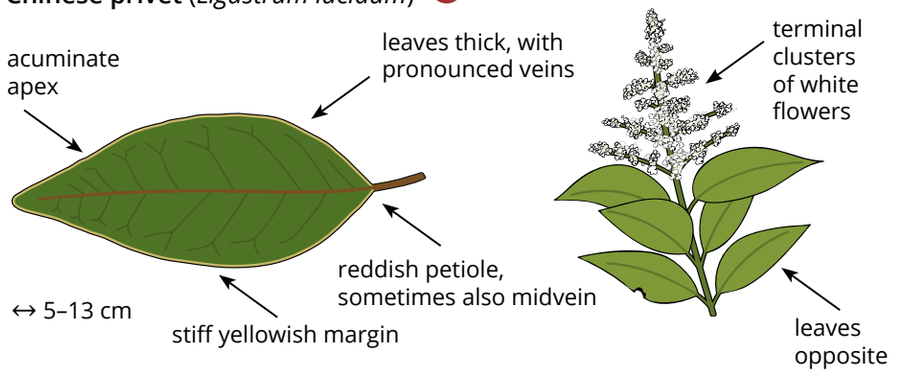
NATIVE RANGE:

East Asia

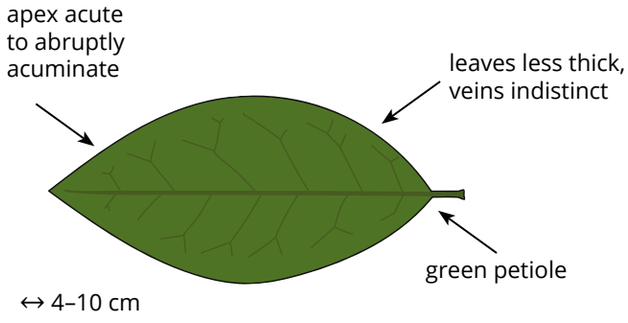
PATHWAYS:

horticulture

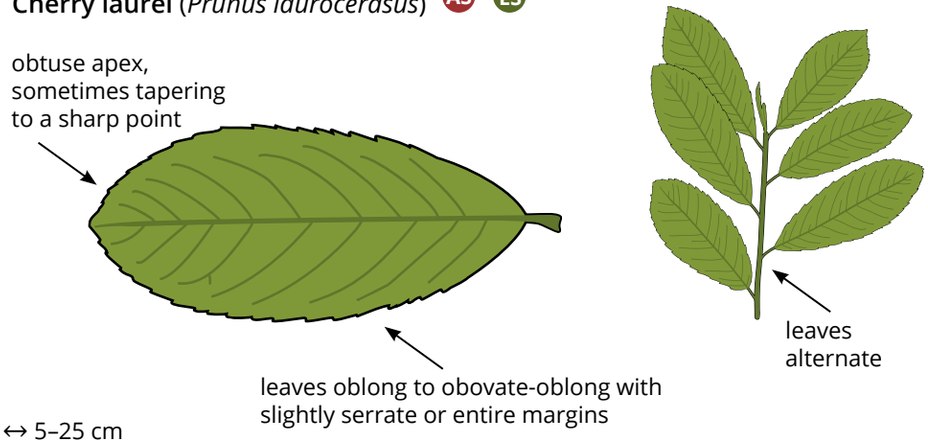
Chinese privet (*Ligustrum lucidum*) AS



Japanese privet (*Ligustrum japonicum*) AS



Cherry laurel (*Prunus laurocerasus*) AS ES



Wolfberry, goji berry

Lycium barbarum L.

Flower

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–3 m

DESCRIPTION: Deciduous shrub with thin, arching branches which bear a few strong thorns, up to 1 cm long. Leaves are narrow lanceolate to elliptic, the widest in the middle. Flowers, single or in groups of up to three, hanging on pedicles. Flowers are narrow tubular, 2 cm across with purple corolla. Fruits are oval, 1–2 cm long, bright orange to red with remnants of calyx at the base.

HABITAT: Riparian forests, ruderal habitats and coastal dunes.

STATUS: Widely recorded throughout Europe with most observations in Western European countries. Commonly cultivated for its edible fruits, also planted in parks and along roadsides.

SIMILAR SPECIES: Bittersweet (*Solanum dulcamara*) has similar red berries with a persistent calyx at its base. Leaves have more pronounced stalks, are broadly lanceolate with cordate leaf base, often with one or two smaller lobes at the stalk. Common barberry (*Berberis vulgaris*) and Japanese barberry (*B. thunbergii*) have both red berries but there is no visible remnant of calyx. Fruits of common barberry are borne in hanging clusters.

TAXONOMY:

Solanaceae

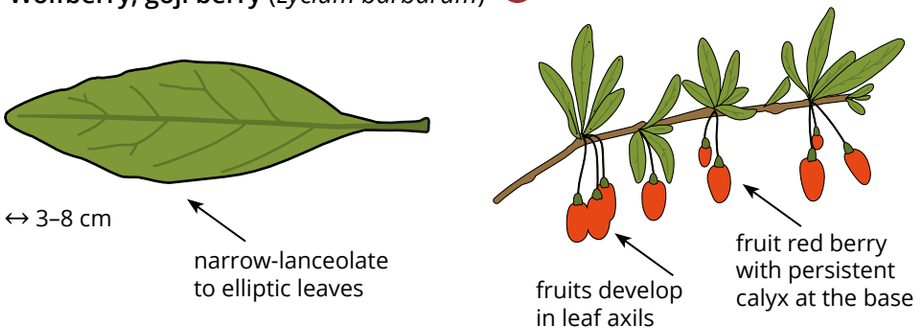
NATIVE RANGE:

East Asia

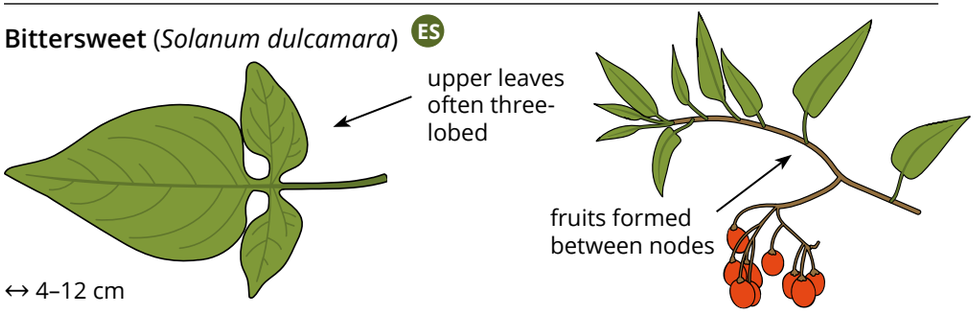
PATHWAYS:

horticulture,
crop plant

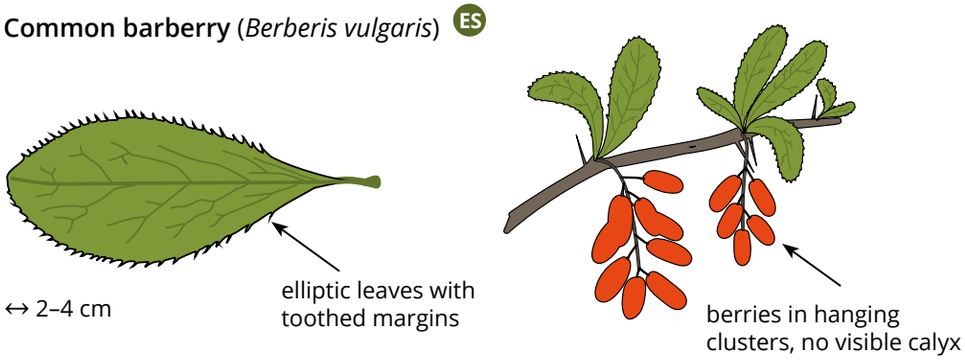
Wolfberry, goji berry (*Lycium barbarum*) AS



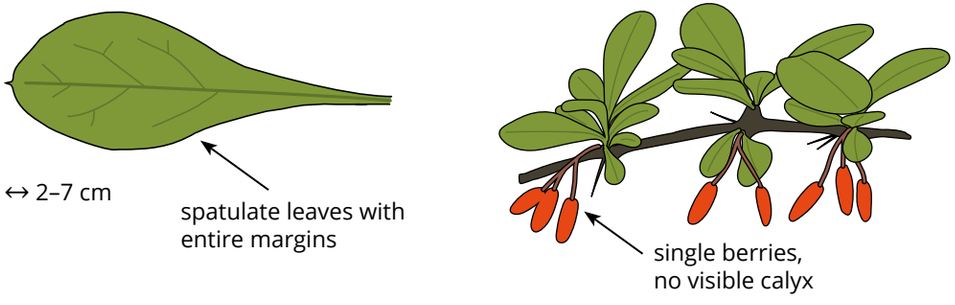
Bittersweet (*Solanum dulcamara*) ES



Common barberry (*Berberis vulgaris*) ES



Japanese barberry (*Berberis thunbergii*) AS



Butterfly bush

IAP

Buddleja davidii Franch.

Flowers also pink or white

New leaves emerge in winter

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 4 m

DESCRIPTION: A shrub with multiple erect branches. Leaves are opposite, lanceolate, finely serrated. Underside densely covered with star-shaped hairs, greyish. New leaves already emerge towards the end of winter. Flowers are borne in long, dense panicles at the end of one-year old branches. Individual flowers are tubular, usually purple, in cultivars also pink, red, white or bluish-purple. Fruits are dry capsules. They ripen throughout summer and numerous tiny seeds are dispersed by wind during the winter.

HABITAT: Grows in riparian thickets within its native range. Naturalised in thermophilic sites, amongst rocks, often in disused quarries, gravel riverbeds, along roadsides, ruins, gravel pits.

STATUS: Occurs locally throughout Europe. Also widely planted as an ornamental to attract butterflies.

SIMILAR SPECIES: Certain other species of butterfly-bushes, sold as ornamental plants, are similar, especially *B.* x *weyeriana, B. globosa* and *B. alternifolia*. Common liliac (*Syringa vulgaris*) has similar clusters of fruits, but it flowers in spring, while its leaves are oval to cordate.

TAXONOMY:

Buddlejaceae

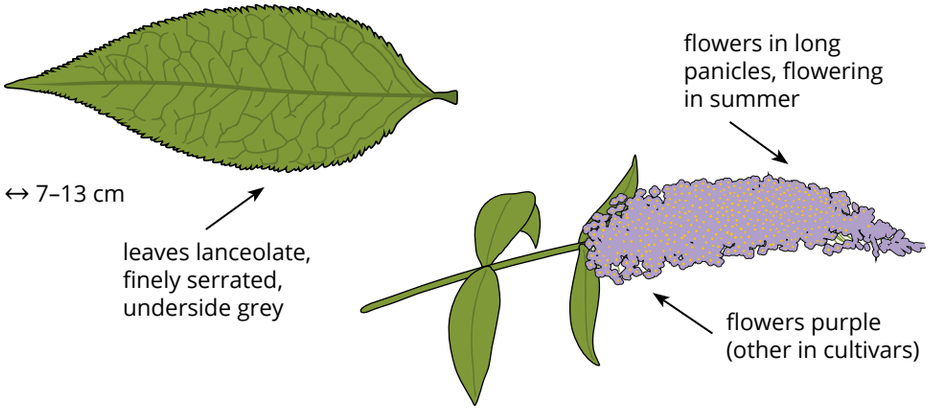
NATIVE RANGE:

East Asia

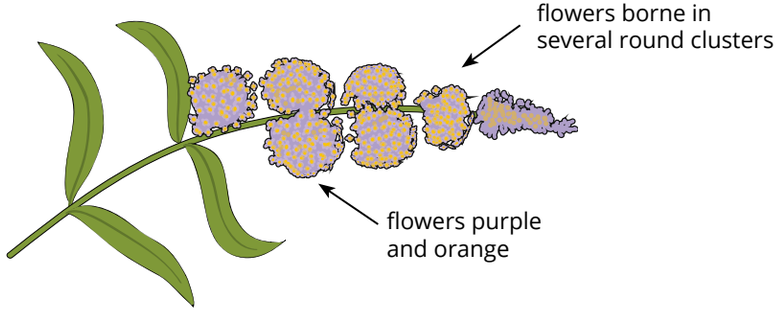
PATHWAYS:

horticulture, honeybee plant

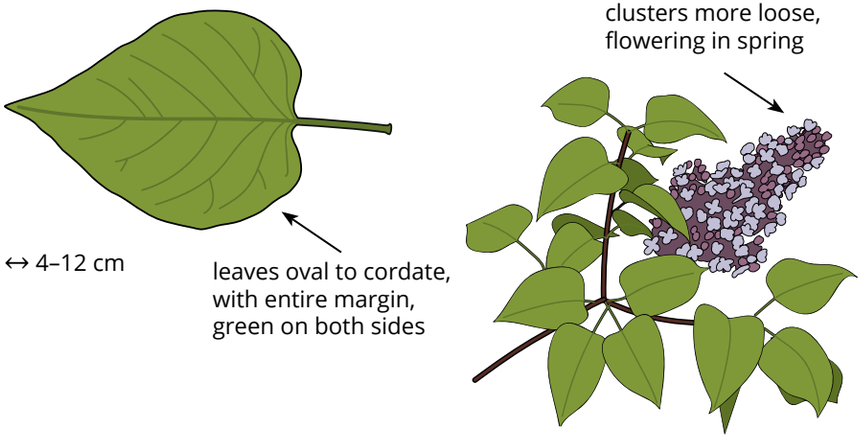
Butterfly bush (*Buddleja davidii*) AS



'Sungold' hybrid buddleia (*Buddleja* x *weyeriana*) AS



Common liliac (*Syringa vulgaris*) AS ES



Running bamboos

Phyllostachys spp.

Lanceolate leaves

Nodulated stem

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 6 m

DESRIPTION: Altogether there are over 1000 bamboo species. The running bamboos of the genus *Phyllostachys* can be distinguished by having pairs of branches on alternating sides of the cane and by distinct vertical grooves on younger canes. The leaf-blade is narrower at the base and appears as if it has a stalk. All are bush-like to tree-like evergreen plants with slender stems. Taller stems are often arched. Bamboos spread via rhizomes and only flower each 65 to 120 years.

HABITAT: Riparian habitats, forest edges, forests. Some species are able to form single-species bamboo forests.

STATUS: Often cultivated, sometimes planted in semi-natural environments. Invasive, particularly in warmer areas and forming dense stands.

SIMILAR SPECIES: Spanish reed (*Arundo donax*), which is native in eastern and southern Asia, and probably in parts of Africa, has blue-green leaves that clasp the stem broadly with a heart-shaped, hairy-tufted base. Common reed (*Phragmites australis*) does not grow more than 3 metres high and has unbranched stems.

TAXONOMY:

Poaceae

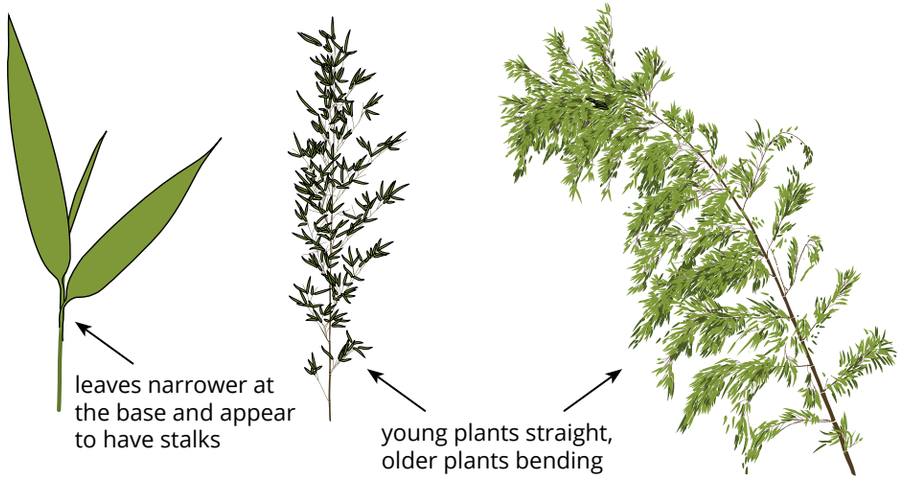
NATIVE RANGE:

Asia (China)

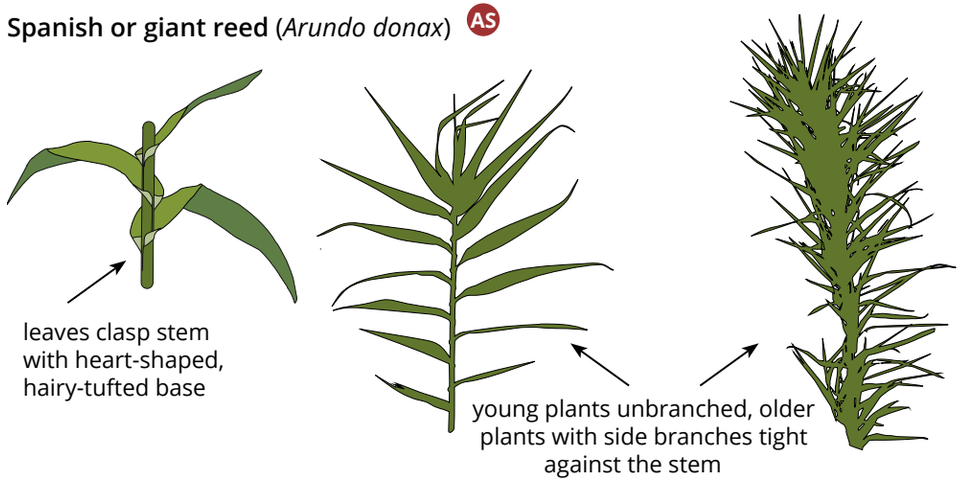
PATHWAYS:

horticulture

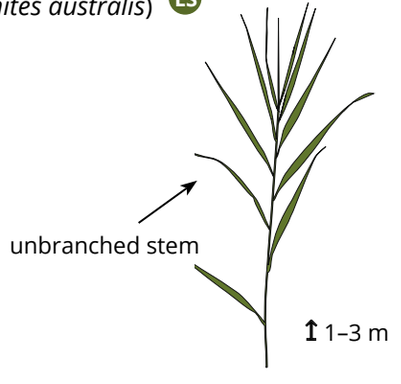
Running bamboos (*Phyllostachys* spp.) AS



Spanish or giant reed (*Arundo donax*) AS



Common reed (*Phragmites australis*) ES



Climbing plants

Authors: Lado Kutnar, Aleksander Marinšek, Jana Kus Veenvliet, Paul Veenvliet

Five-leaf akebia

Akebia quinata (Houtt.) Decne.

OBS

Palmately compound leaf

Female and male flowers

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 12 m

DESCRIPTION: A climbing vine or ground cover. Leaves spiralling on spurs (short branches), palmately compound with five elliptic leaflets, 3–6 cm long. Monoecious, but male and female flowers are separate and borne either in the same or in separate clusters. Female flowers are purplish-pink, 25–30 mm across while the male ones are smaller and paler. Flowers have a vanilla-like fragrance. The fruit is a purplish-pink, pod, 6–8 cm long, containing black seeds. The plants are self-sterile and fruits only develop when flowers receive pollen from a genetically different clone.

HABITAT: In its native range the species grows in riparian habitats and on mountain slopes.

STATUS: Recorded locally in Western and Central Europe. It is also used as an ornamental plant in gardens.

SIMILAR SPECIES: Three-leaf akebia (*Akebia trifoliata*), is also sold as an ornamental plant, but has only three leaflets. Virginia creeper (*Parthenocissus quinquefolia*), is also similar but has broadly lanceolate leaflets with serrated leaf margins.

TAXONOMY:

Lardizabalaceae

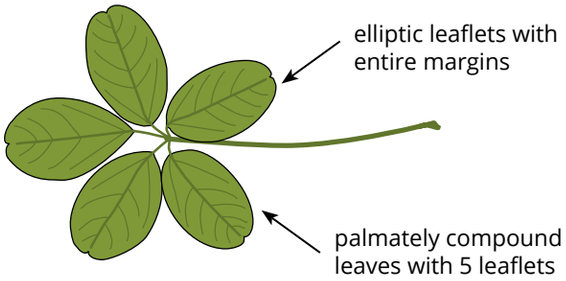
NATIVE RANGE:

East Asia

PATHWAYS:

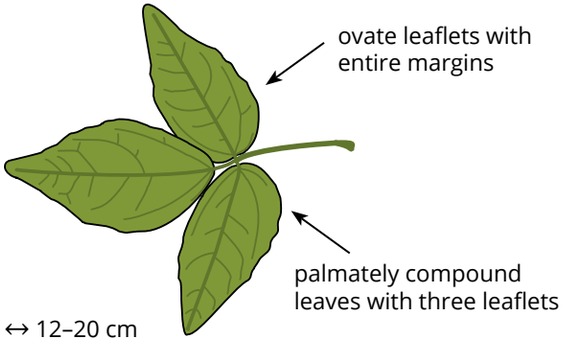
horticulture

Five-leaf akebia (*Akebia quinata*) AS



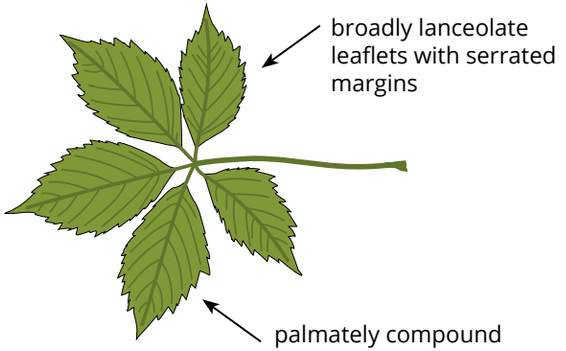
↔ 10–18 cm

Three-leaf akebia (*Akebia trifoliata*) AS



↔ 12–20 cm

Virginia creeper (*Parthenocissus quinquefolia*) AS



↔ 5–15 cm

Russian vine

Fallopia baldschuanica (Regel) Holub

IAP

Flower spikes

Wavy leaf margin

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–1.8 m

DESCRIPTION: A perennial, deciduous woody climber. It has brown bark with lenticels. Leaves are opposite, simple, oblong-ovate with acute apex, often growing from the stem in groups of 2 or 3 leaves. Leaf margins and the whole lamina appear wavy. Flowers are small, 5–8 mm across, with five tepals (perianth segments) which are white, greenish or pale pink, with pubescent filaments among the stamens. Flowers are borne in branched clusters up to 15 cm long. The fruit is a shiny black achene, 2 mm wide, enclosed in the three outer tepals which persist after flowering.

HABITAT: In its native range it grows in forests on mountain slopes and valleys. In Europe it is especially found in places where garden waste is dumped.

STATUS: Widespread in western Europe with most observations from the UK. Found locally elsewhere.

SIMILAR SPECIES: Chinese knotweed (*F. multiflora*) has acuminate leaf apexes and cordate leaf bases. Leaves are not wavy. Flowers 2–4 mm across, filaments are glabrous. Bark without lenticels. Black bindweed (*F.convolvulus*) and copse bindweed (*F. dumetorum*) have much smaller leaves with a pronouncedly cordate leaf base.

TAXONOMY:

Polygonaceae

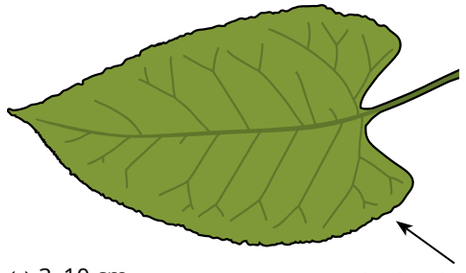
NATIVE RANGE:

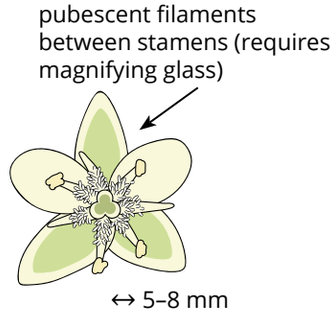
central and eastern Asia

PATHWAYS:

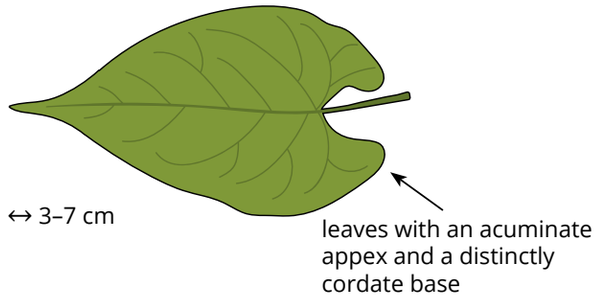
horticulture

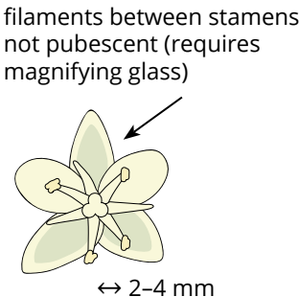
Russian vine (*Fallopia baldschuanica*) AS



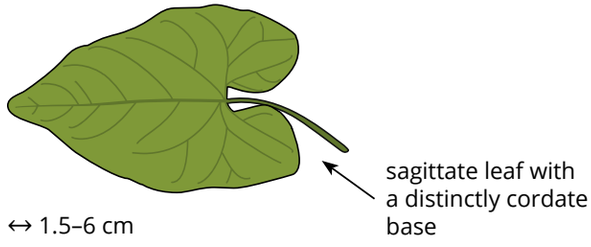


Chinese knotweed (*Fallopia multiflora*) AS





Black bindweed (*Fallopia convolvulus*) ES



Japanese hop

BIO A2

Humulus scandens (Lour.) Merr., syn. *Humulus japonicus* Sieb. et Zucc.

Fruiting head

Stiff hairs on stems

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 2.5–10 m

DESCRIPTION: Dioecious annual or, in optimal conditions, perennial climbing plant, which may vigorously grow over other plants. It is a left-handed twining plant (climbing anti-clockwise). Leaves are about as broad as long, palmately divided into 5 to 9 elliptic lobes. Stems, leaves and stipules are covered with stiff hairs. These are most pronounced on the undersides of leaves. Green flowers are borne in upright spikes. The fruiting head is a pendulous cone-like structure, up to 4 cm long, initially green and brown when ripe.

HABITAT: Riparian forests, forest edges, roadsides and ruderal habitats.

STATUS: Occurs locally, especially in parts of Hungary and in Northern Italy. It is also cultivated in gardens.

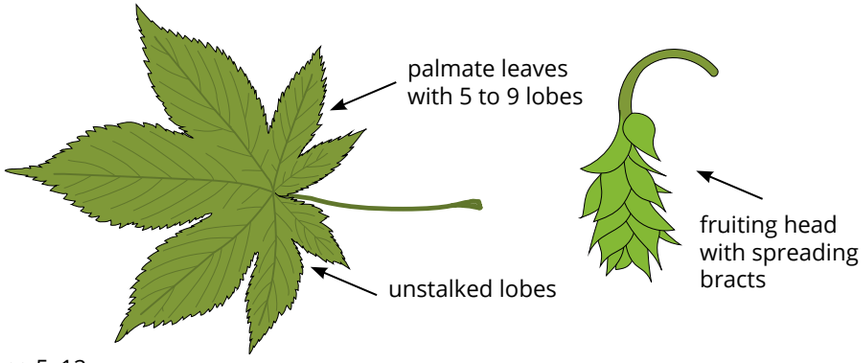
SIMILAR SPECIES: Common hop (*Humulus lupulus*) is a dioecious, perennial, right-handed twinning plant (climbing clockwise). Leaves palmately compound with 3 to 5 lobes which have a cordate base. The leaf stalk is shorter than the lamina. Virginia creeper (*Parthenocissus quinquefolia*) is also a climbing plant with palmately compound leaves, but has 5 to 7 stalked leaflets. Its fruits are dark blue berries.

TAXONOMY:
Cannabaceae

NATIVE RANGE:
East Asia

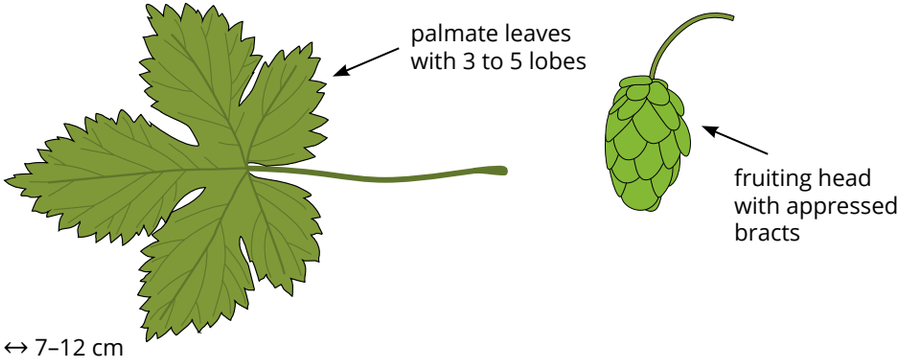
PATHWAYS:
horticulture

Japanese hop (*Humulus japonicus*) AS



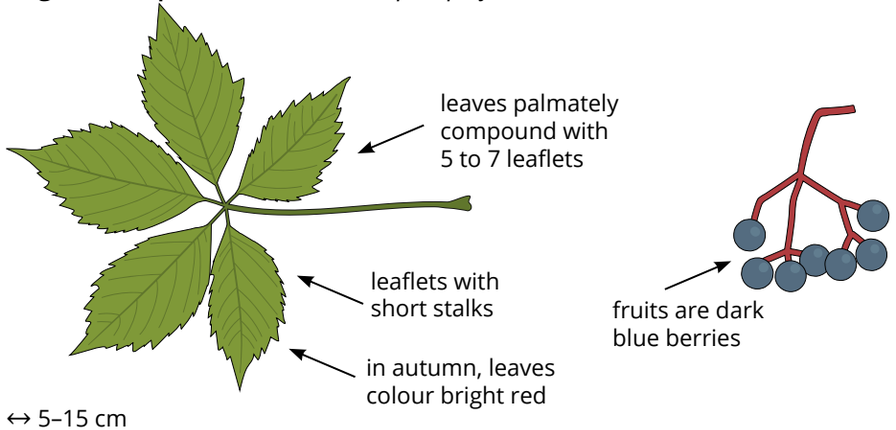
↔ 5–12 cm

Common hop (*Humulus lupulus*) ES



↔ 7–12 cm

Virginia creeper (*Parthenocissus quinquefolia*) AS



↔ 5–15 cm

Kudzu

BIO A2

Pueraria montana var. *lobata* (Willd.) Maes. & S. Almeida

Flowers in erect clusters

Palmately compound leaf

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ up to 20 m

DESCRIPTION: A fast-growing climbing vine, which can grow up to 30 cm per day. It can climb over trees and other vertical structures but in the absence of these, it trails over the ground. Leaves are palmately compound with three leaflets, of which the terminal leaflet is three-lobed, while the side leaflets are two or three-lobed. Leaflets have pillose undersides and edges. Purple to red flowers are borne in upright clusters, up to 15 cm long, and have a yellow spot at the base of upper petals. The fruit is an up to 8 cm, densely pillose pod. It has a strong, perennial taproot and mainly reproduces vegetatively via stolons (runners) which root at the nodes.

HABITAT: Montane forests, forest edges, ruderal habitats.

STATUS: Found locally in Switzerland, Italy, Slovenia, Croatia, Bosnia and Herzegovina, Ukraine and Russia.

SIMILAR SPECIES: Common bean (*Phaseolus vulgaris*) has a similar growth habit, but its leaflets are not palmately compound and have only a few hairs. Its red, pink or white flowers are borne in loose clusters and don't have a yellow patch in the centre.

TAXONOMY:

Fabaceae

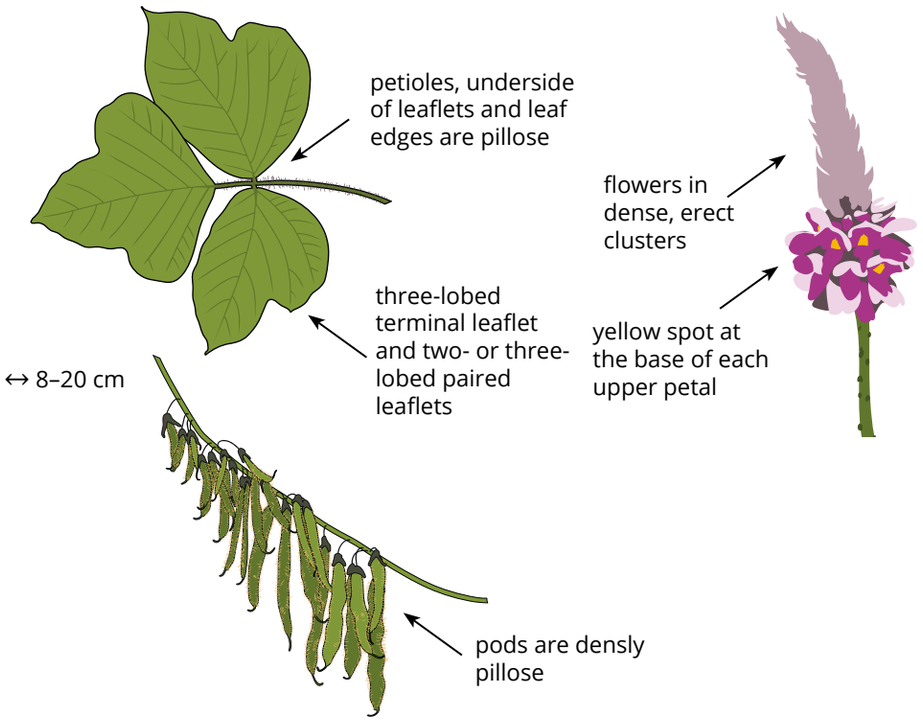
NATIVE RANGE:

East Asia

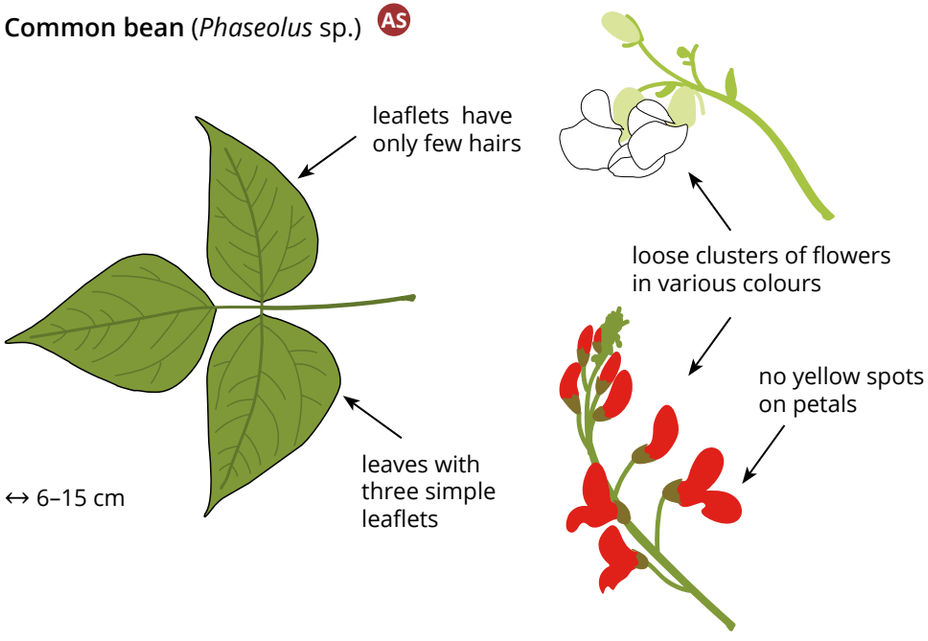
PATHWAYS:

horticulture,
erosion control

Kudzu (*Pueraria montana* var. *lobata*) AS



Common bean (*Phaseolus* sp.) AS



Chinese wisteria

Wisteria sinensis (Sims) Sweet

Hanging flower racemes

Ripe pods

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 20 m

DESCRIPTION: Left-handed twining vine, climbing anti-clockwise over trees and shrubs. Leaves are spiralling, pinnately compound with 7 to 13 leaflets which are ovate with an acuminate apex. The numerous purple flowers (in some cultivars also pink or white) are borne in hanging racemes, 20-30 cm long. They appear in late spring with the leaves, all the flowers of one raceme opening simultaneously. Fruits are pods 10–15 cm long, finely pillose, brown when ripe.

HABITAT: Within its native range it grows in forests and ruderal sites.

STATUS: Widespread throughout Europe but so far mostly in urban areas.

SIMILAR SPECIES: Japanese wisteria (*W. floribunda*) has 9 to 15 leaflets and twines clockwise. American wisteria (*W. frutescens*) twines anti-clockwise like Chinese wisteria, but has 9 to 15 leaflets. It flowers only after the appearance of the leaves. Flower racemes are only 10–15 cm long. Its ripe pods are green and glabrous. Trumpet creeper (*Campsis radicans*) has opposite pinnately compound leaves. Its leaflets are coarsely serrated and its orange to red tubular flowers are up to 8 cm long.

TAXONOMY:

Fabaceae

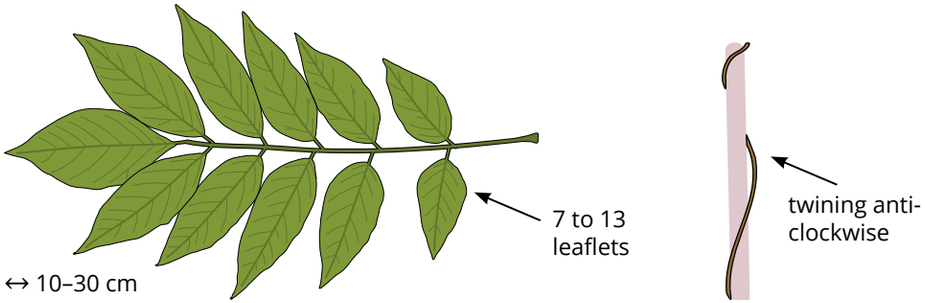
NATIVE RANGE:

China

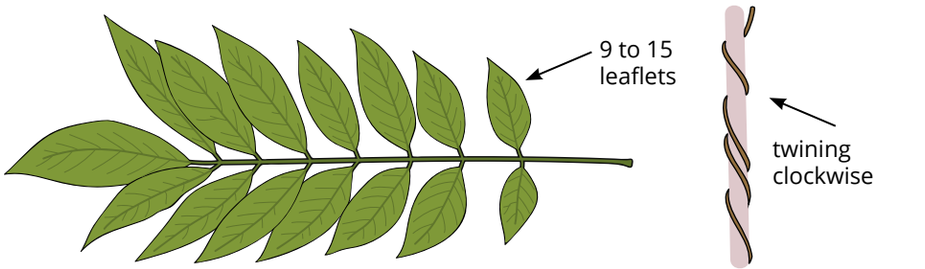
PATHWAYS:

horticulture

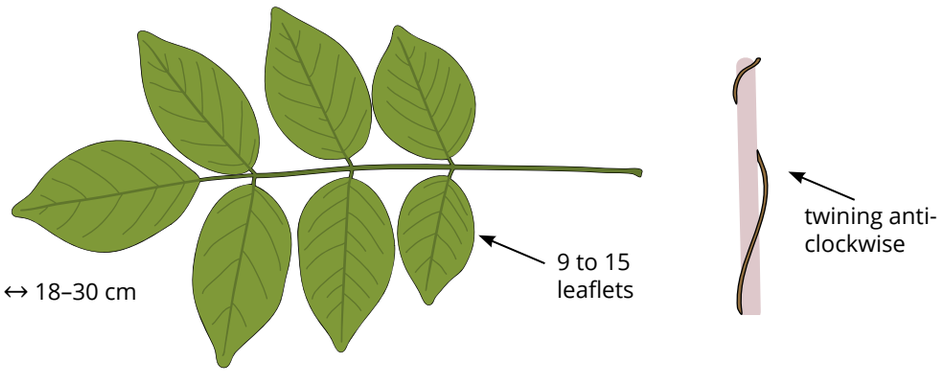
Chinese wisteria (*Wisteria sinensis*) AS



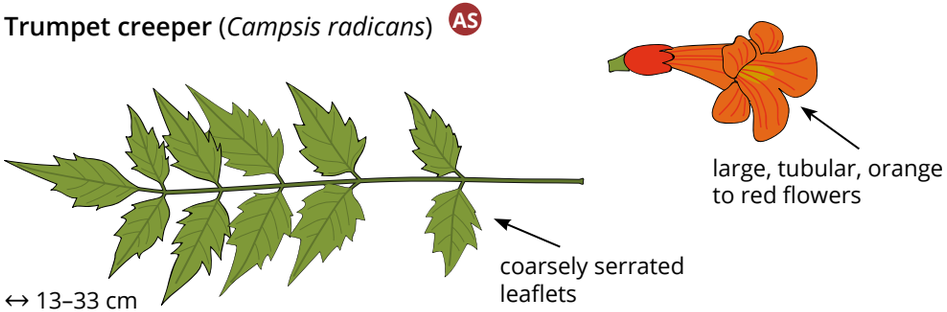
Japanese wisteria (*Wisteria floribunda*) AS



American wisteria (*Wisteria frutescens*) AS



Trumpet creeper (*Campsis radicans*) AS



Frost vine

Vitis vulpina L.

Bark shedding in strips

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 25 m

DESCRIPTION: Perennial woody vine with thick stems and red tendrils that are lacking at every 3rd node. The bark is reddish-brown, shedding itself in lengthwise strips. Leaves are similar to those of a lime-tree in shape, alternate and simple, sometimes shallowly three-lobed. Margins are sharply and coarsely dentate. Leaves are mostly glabrous, with only some short hairs along veins. Upper surface is medium green, slightly lighter below but not grey. Flowers small, monoecious or dioecious, in clusters 10–15 cm long. Fruits are 3–10 mm dia. berries, initially green, turning black when ripe.

HABITAT: Dry or moist lowland forests, scrubland and disturbed habitats (river banks, hedgerows).

STATUS: Established in southern France with a few scattered records from other parts of Europe.

SIMILAR SPECIES: Leaves of grapevine (*Vitis vinifera* subsp. *vinifera*), wild grape (*Vitis vinifera* subsp. *sylvestris*) and fox grape (*Vitis labrusca*) are markedly three-lobed, differently indented on bases. Boston ivy (*Parthenocissus tricuspidata*) has shallowly three-lobed leaves with only slightly indented leaf-bases.

TAXONOMY:

Vitaceae

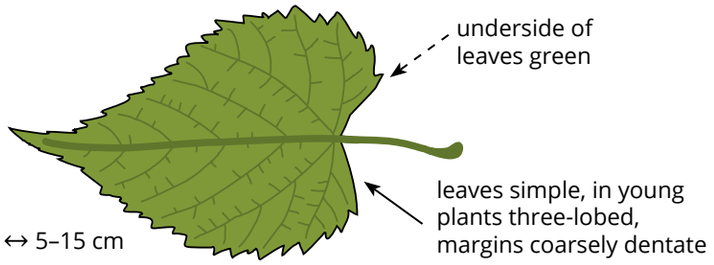
NATIVE RANGE:

North America

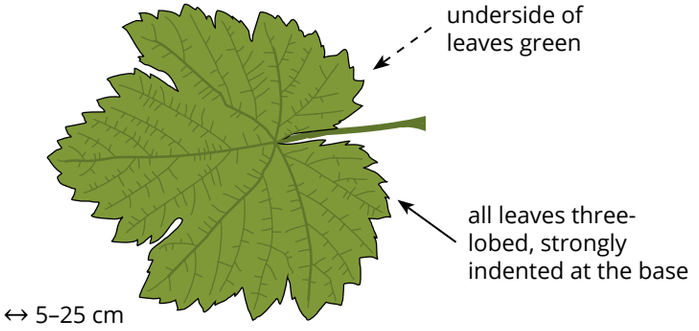
PATHWAYS:

horticulture,
rootstock plant

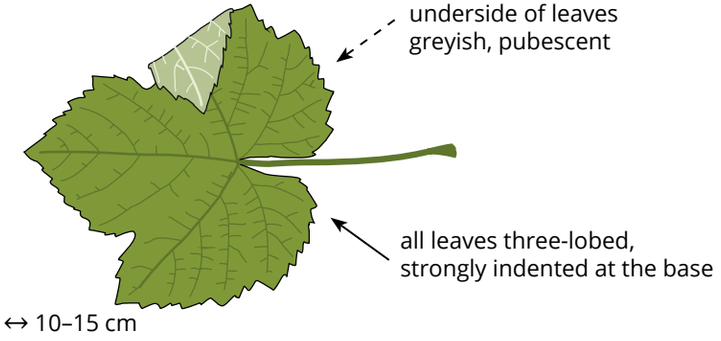
Frost vine (*Vitis vulpina*) AS



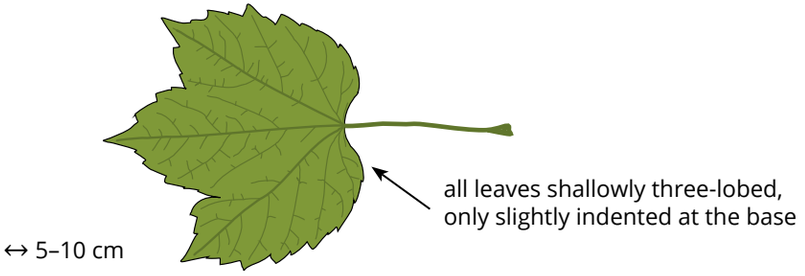
Grapevine (*Vitis vinifera*) ES



Fox grape (*Vitis labrusca*) AS



Boston ivy (*Parthenocissus tricuspidata*) AS



Bur cucumber

IAP

Sicyos angulatus L.

Flowers and fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 6 m

DESCRIPTION: Annual vine with branched tendrils opposite each leaf. The stem is pale green and covered with hairs. Leaves are alternate, palmately compound, with a slightly serrated margin. Leaves are glabrous above, finely pubescent below, especially along the veins on the underside. Flowers monoecious, small (up to 1 cm), greenish-yellow and borne in racemes. Fruits are oval capsules 1.5 cm long, in clusters of up to 10, covered with bristly, hairy spines and each contain just one seed.

HABITAT: Fertile and moist habitats, especially in flood-plains, wet meadows, but also in scrubland, clearings, along ditches, roadsides and forest edges.

STATUS: Established in Northern Italy and parts of Poland. Scattered observations in the rest of Europe.

SIMILAR SPECIES: Wild cucumber (*Echinocystis lobata*), has hairless stems, deeply lobed leaves, and white to greenish dioecious flowers, which are borne in upright clusters. Its fruit is a large, egg-shaped pepo up to 6 cm long, covered with soft, pointed, green spines. Similar in growth habit are the black-berried white bryony (*Bryonia alba*), and red bryony (*B. dioica*) which bears red berries.

TAXONOMY:

Cucurbitaceae

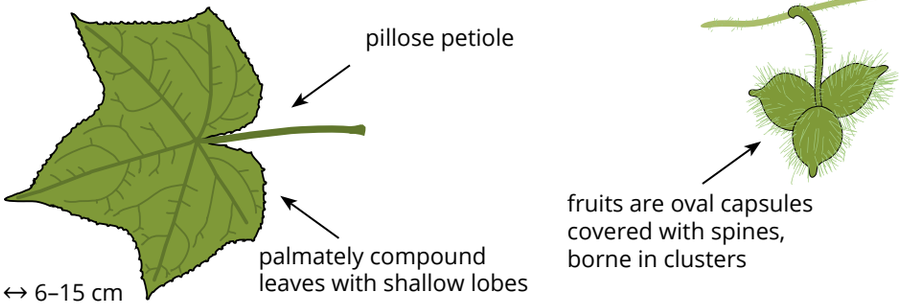
NATIVE RANGE:

North America

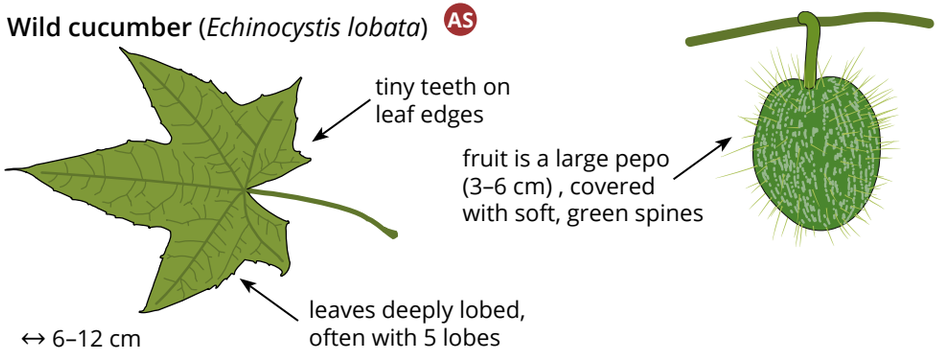
PATHWAYS:

horticulture,
seed contaminants

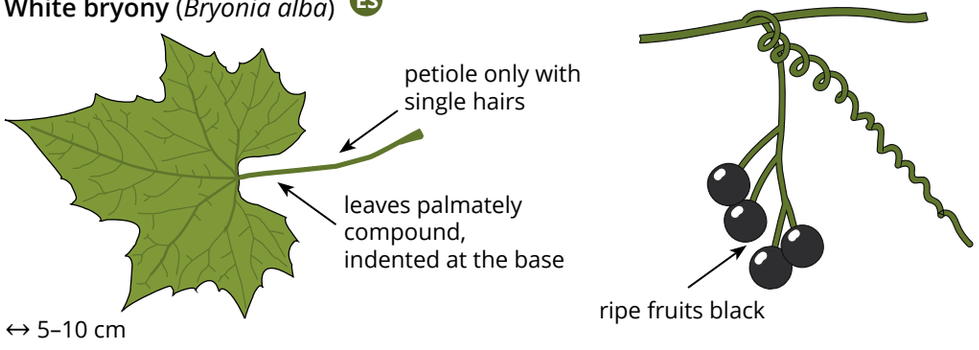
Bur cucumber (*Sicyos angulatus*) AS



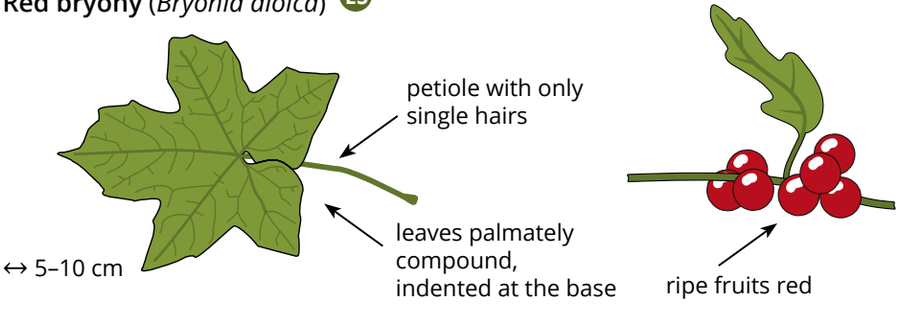
Wild cucumber (*Echinocystis lobata*) AS



White bryony (*Bryonia alba*) ES



Red bryony (*Bryonia dioica*) ES



Japanese honeysuckle

Lonicera japonica Thunb.

Leaves opposite

Paired flowers

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 1–2 m

DESCRIPTION: A scrambling, twisting vine, climbing on trees and bushes or trailing on the ground. Leaves opposite, lanceolate to ovate, lower leaves sometimes palmately compound. Leaves have short petioles and truncate, acute or cordate leaf bases. They are dark green above, slightly lighter below. Flowers are fragrant, 3–5 cm across, borne in pairs on axillary peduncles. Corolla pubescent, initially white, later turning yellow. Fruits are shiny black berries, which are fused at the base. It reproduces both vegetatively and via seeds.

HABITAT: Scrub, sparse forests, mountain slopes, stony sites, roadsides; (800–)1500 m.

STATUS: Common in Spain, France and the United Kingdom with fewer observations throughout the rest of Europe. Regularly cultivated in gardens.

SIMILAR SPECIES: Evergreen honeysuckle (*L. acuminata*) has lanceolate to linear-lanceolate leaves, and smaller flowers which are not fragrant. In perfoliate honeysuckle (*L. caprifolium*) the uppermost leaves are fused around the stem. Flowers are placed in leaf axils in groups of six. Berries are red. The European native, Etruscan honeysuckle (*L. etrusca*) has similar characteristics.

TAXONOMY:

Caprifoliaceae

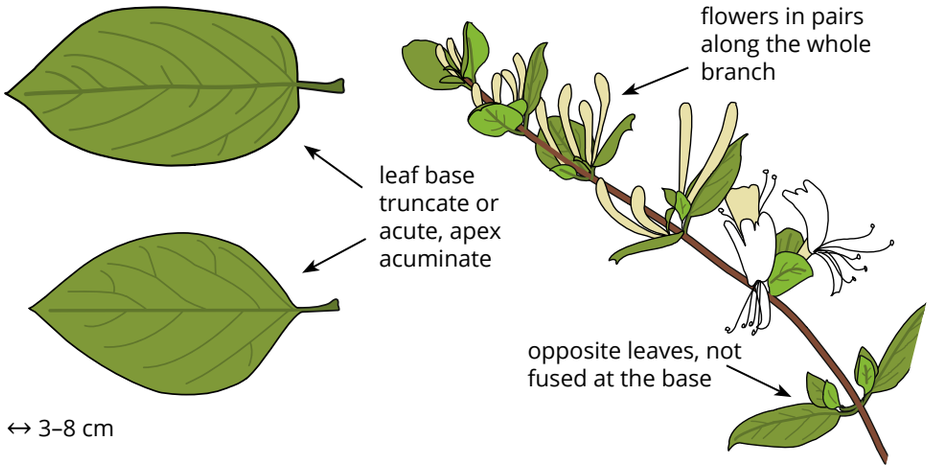
NATIVE RANGE:

East Asia (Japan, China, Korea)

PATHWAYS:

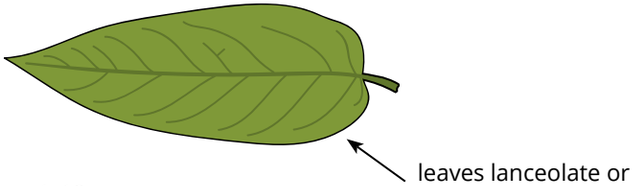
horticulture

Japanese honeysuckle (*Lonicera japonica*) AS



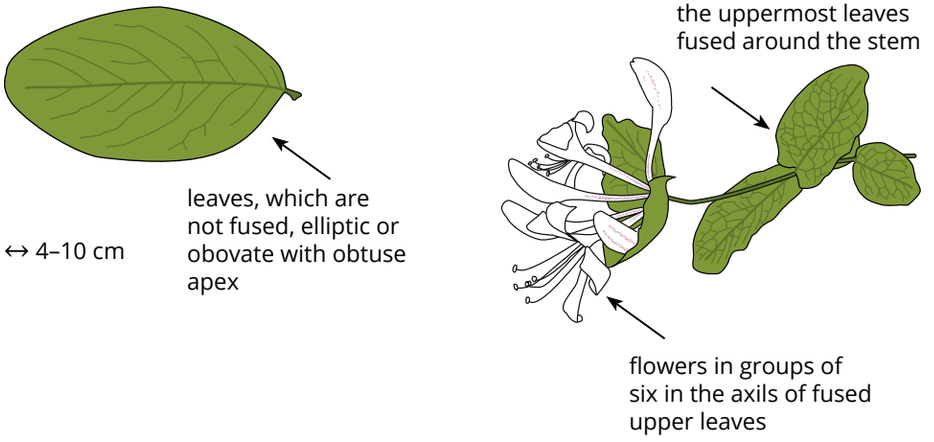
↔ 3–8 cm

Evergreen honeysuckle *(Lonicera acuminata)* AS



↔ 4–12 cm

Perfoliate honeysuckle (*Lonicera caprifolium*) ES



↔ 4–10 cm

Cape ivy

Delairea odorata Lem., syn. *Senecio mikanioides*

IAP

Clusters of flowerheads

Glossy, fleshy leaves

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 8 m

DESCRIPTION: Perennial herbaceous vine with a woody rootstock. Deciduous, in milder climate evergreen. Stems fleshy, glabrous, often purple when young, later green and eventually creamy-brown. Leaves spiralling, palmately compound, glossy and fleshy. Petioles are longer than the lamina. Usually, there is a pair of flattened, kidney-shaped stipules at the base of the petioles. Flower heads are borne in dense clusters. Flowers consist solely of disc florets, surrounded by small green bracts with ray florets absent. Flowers during winter and early spring. Fruits are reddish-brown achenes, 2 mm long. Pappus cylindric, 5–6 mm long. The plant has an unpleasant smell.

HABITAT: Within native range grows on humid sites, especially along forest edges and in clearings.

STATUS: Found in Western and Southwestern Europe. Most observations from Spain, Portugal, France, the United Kingdom and Ireland.

SIMILAR SPECIES: Climbing groundsel (*Senecio angulatus*), has more fleshy leaves and flowers with ray florets. Wild cucumber (*Echinocystis lobata*) has similar, but more deeply lobed leaves. Flowers white, fruit is a large pepo with prickles. Ivy (*Hedera helix*) has darker, evergreen leaves. Its flowers are green and borne in small clusters.

TAXONOMY:

Asteraceae

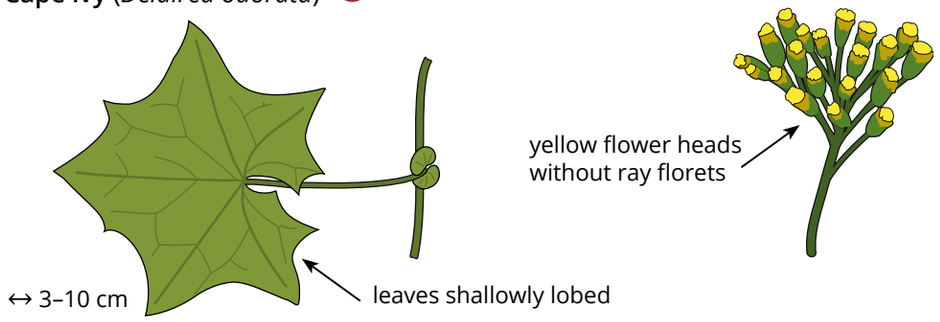
NATIVE RANGE:

South Afrika

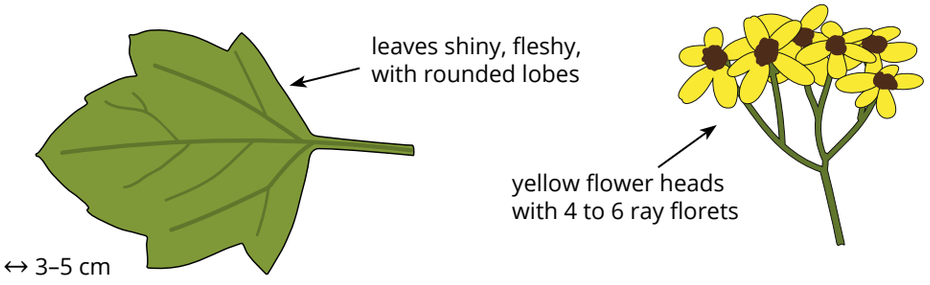
PATHWAYS:

horticulture

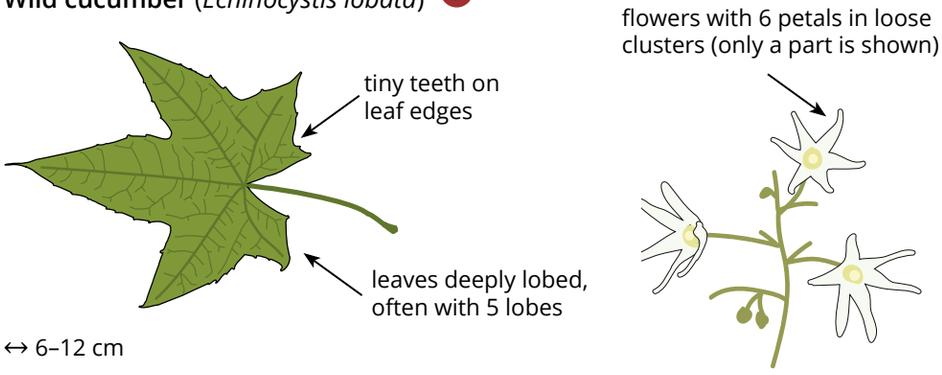
Cape ivy (*Delairea odorata*) AS



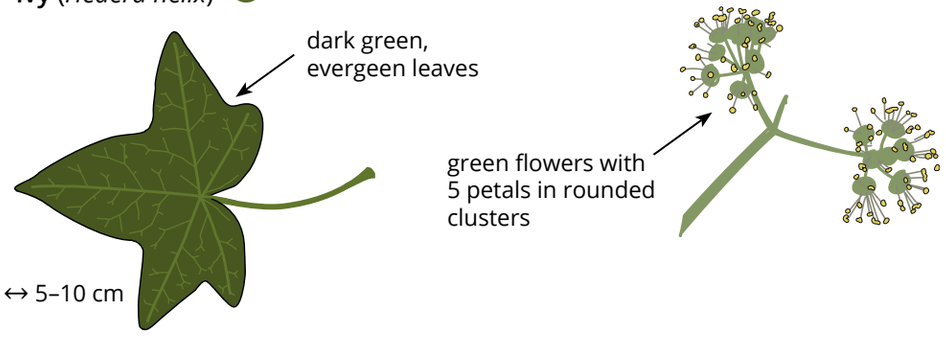
Climbing groundsel (*Senecio angulatus*) AS



Wild cucumber (*Echinocystis lobata*) AS



Ivy (*Hedera helix*) ES



Cruel plant

OBS

Araujia sericifera Brot.

Flower

Large pear-shaped fruit

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 7 m

DESCRIPTION: Twining, evergreen climber. Leaves opposite, almost triangular in shape, with acute apex, broadly cuneate to truncate base and entire margins. Young leaves are finely pubescent, older leaves shortly tomentose only on the underside. Many strongly fragrant flowers develop on the stems. These are about 2 cm wide with 5 white, purple or pink petals and 5 erect, green sepals. Fruits are pear-shaped pods, containing numerous black seeds, bearing silky hairs which assist in wind dispersion, 8–10 cm long, widest at the base and narrowest towards the tip.

HABITAT: Growing both in the sun and partial shade. As an invasive species occurring in degraded areas, partially overgrown with woody vegetation, in forests and on rocky sites.

STATUS: Largely restricted to Mediterranean parts of Spain and France, with few records from other countries.

SIMILAR SPECIES: None.

TAXONOMY:

Apocynaceae

NATIVE RANGE:

South America

PATHWAYS:

horticulture

Herbaceous plants

Authors: Lado Kutnar, Aleksander Marinšek, Jana Kus Veenvliet, Paul Veenvliet, Johan L.C.H. van Valkenburg

Asiatic dayflower

Commelina communis L.

Sheath at the leaf base

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 50 cm

DESCRIPTION: An annual herb up to 50 cm tall with thick, fleshy stems, up to 80 cm long, rooting at the nodes. Leaves are sessile, fleshy, ovate-lanceolate, 5–7 cm long (rarely to 12 cm), with glabrous sheaths at the base which clasp the stem. The inflorescence is a cyme, subtended by a leaf-like bract. The flowers have ovate, membranous sepals and two large, bright blue petals. The fruit is a 2-celled capsule which usually contains 4 seeds.

HABITAT: Moist, open places, including forest edges, riparian habitats, wet parts of fields, orchards, ditches, roadsides and ruderal habitats.

STATUS: Locally naturalised throughout Europe.

SIMILAR SPECIES: Spreading dayflower (*Commelina diffusa*) has a more spreading habit, the leaf margin and leaf sheaths are hairy. It has 3 blue sepals and a 3-celled capsule. Small-leaf spiderwort (*Tradescantia fluminensis*) is a perennial with a spreading habit, hairy leaf sheath margins and flowers with 3 white sepals.

TAXONOMY:

Commelinaceae

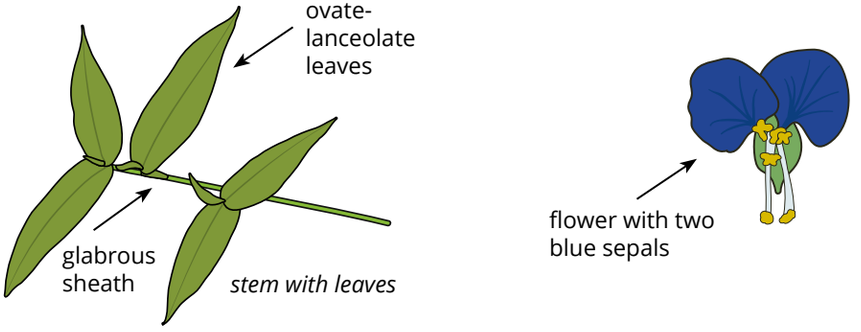
NATIVE RANGE:

east Asia and northern part of Southeast Asia

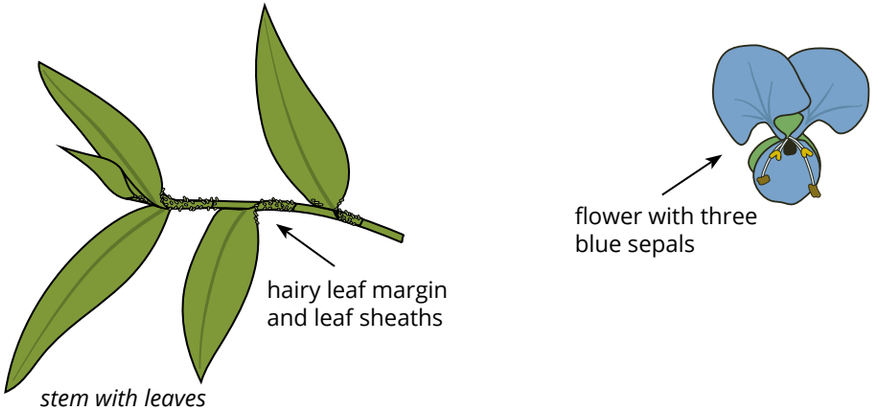
PATHWAYS:

horticulture

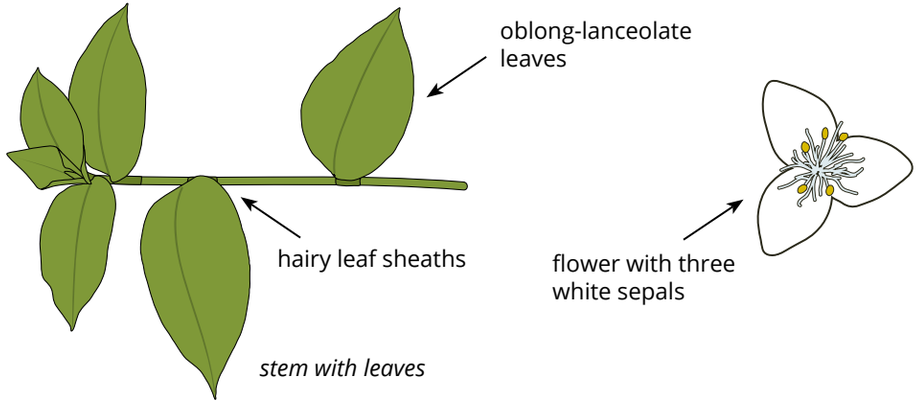
Asiatic dayflower (*Commelina communis*) AS



Spreading dayflower (*Commelina diffusa*) AS



Small-leaf spiderwort (*Tradescantia fluminensis*) AS



American skunk cabbage

Lysichiton americanus Hultén & H. St. John

BIO OBS

Erect inflorescence

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 0.5 m (max 1.5 m)

DESCRIPTION: Herbaceous perennial. In spring, light green leaves emerge from brown rhizomes. Leaves grow to 40–100 cm long and 25–70 cm broad, and have an irregularly wavy lamina. Crushed leaves and flowers have an unpleasant odour. Flowers, which usually emerge before the leaves, are clustered in erect, yellow-green inflorescences, which are 3.5–12 cm long, surrounded by yellow spathes, 10-35 cm long. The flower stem is without leaves, initially short, then elongating. Fruits are green berries, each containing two seeds.

HABITAT: Grows in moist habitats, for example in moist forests, bogs and marshland as well as along streams.

STATUS: Naturalised and invasive, in particularly in some northern European countries.

SIMILAR SPECIES: Asian skunk cabbage (*L. camtschatcensis*) white spathes and rhizomes. The plant does not have an unpleasant smell. Skunk cabbage (*Symplocarpus foetidus*) has cordate to ovate leaves. The spathe is purple with green blotches. Native European aroids are much smaller. Bog arum (*Calla palustris*) has a white spathe, Italian arum (*Arum italicum*) and Cuckoopint (*Arum maculatum*) have light green spathes.

TAXONOMY:

Araceae

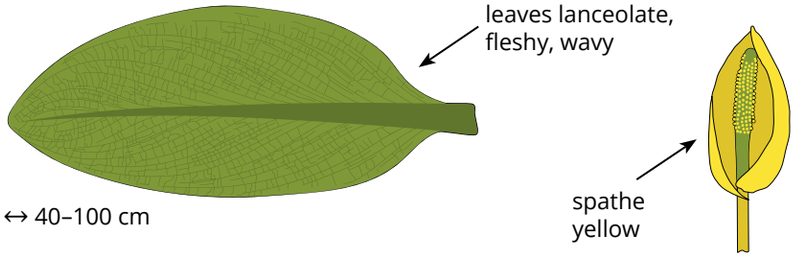
NATIVE RANGE:

western North America

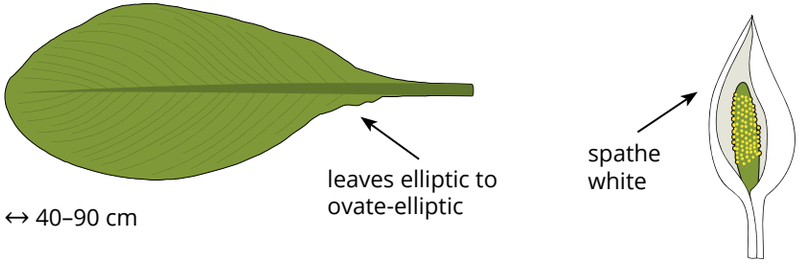
PATHWAYS:

horticulture

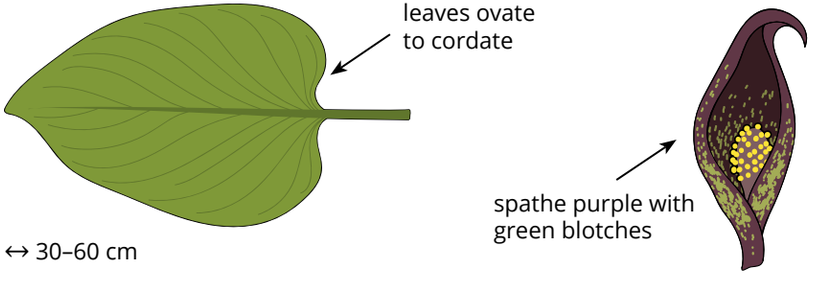
American skunk cabbage (*Lysichiton americanus*) AS



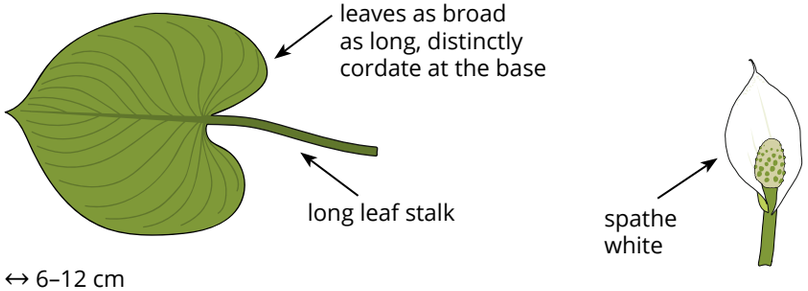
Asian skunk cabbage (*Lysichiton camtschatcensis*) AS



Skunk cabbage (*Symplocarpus foetidus*) AS



Bog arum (*Calla palustris*) ES



American pokeweed

Phytolacca americana L.

Raceme of flowers

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ up to 2 m

DESCRIPTION: A branching herbaceous perennial, which may have a partially woody lower stem. The stems of adult plants are usually reddish. Leaves lanceolate, up to 30 cm long. Flowers are borne racemes, up to 30 cm long, which arching towards the end of flowering. Flowers are white. Fruits are round berries, slightly indented at the top, borne in arching clusters. Unripe fruits are green, when ripe they are shiny dark purple. Plants die back each winter.

HABITAT: Growing on shady, nutrient-rich and moist ruderal sites, forest edges, arable fields and wastelands.

STATUS: Widespread all over Europe.

SIMILAR SPECIES: Indian pokeweed (*Phytolacca acinosa*) usually only grows to 1.2 m. Inflorescence and fruits are borne in erect clusters. European native deadly nightshade (*Atropa belladonna*) has a similar erect, fleshy stem, but flowers are single, purple-brown and pendulous. Fruits are initially green, turning black when ripe, with a persistent calyx. Its berries are highly toxic!

TAXONOMY:

Phytolaccaceae

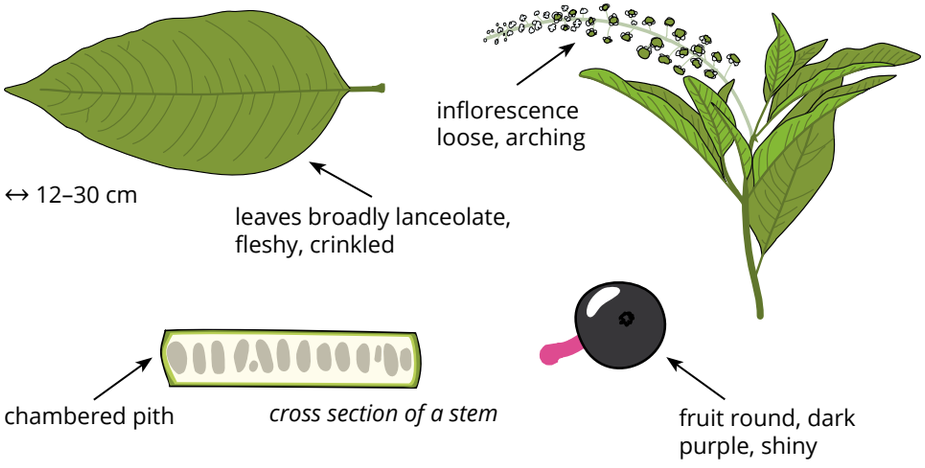
NATIVE RANGE:

North America

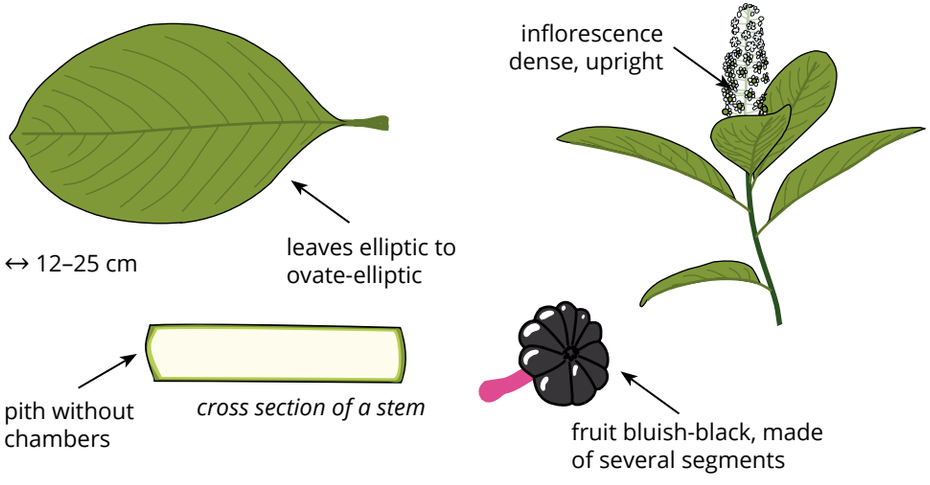
PATHWAYS:

horticulture, weed, seeds dispersed by birds

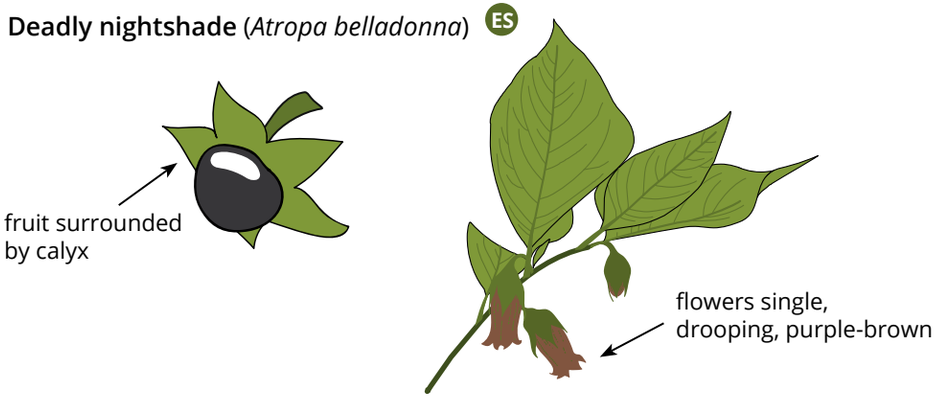
American pokeweed (*Phytolacca americana*) AS



Indian pokeweed (*Phytolacca acinosa*) AS



Deadly nightshade (*Atropa belladonna*) ES



Himalayan knotweed

Persicaria wallichii Greuter & Burdet

Branched flower spikes

Reddish-brown sheaths

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1–1.8 m

DESCRIPTION: A fast-growing perennial with an erect, hollow stem that is green, with twigs that zig-zag from one leaf node to the next. Reddish-brown leaf sheaths envelop the stem nodes at the base of each leaf. Leaves are spiralling, lanceolate, with an acuminate apex, truncate at the base, with two small lobes. Leaf stalks and at least the lower part of the mid-vein are reddish. Flowers are small, white to pink, clustered in upright, branched spikes at the end of branches and in the axils of the upper leaves. Fruits are small brown achenes but rarely form.

HABITAT: Forests, shrubland and bare slopes.

STATUS: Invasive in northern Europe and appears to be established in Central Europe.

SIMILAR SPECIES: Japanese knotweed (*Fallopia japonica*) and hybrid Bohemian knotweed (*Fallopia* x *bohemica*) have broadly ovate leaves. In both taxa, clusters of flowers are also formed in the middle of branches, not only in the upper part. Prince's feather (*Polygonum orientale*) has bright pink flowers. European natives redshank (*P. persicaria*), water-pepper (*P. hydropiper*) and tasteless water-pepper (*P. mite*) have much smaller leaves and unbranched white or pink flower spikes.

TAXONOMY:

Polygonaceae

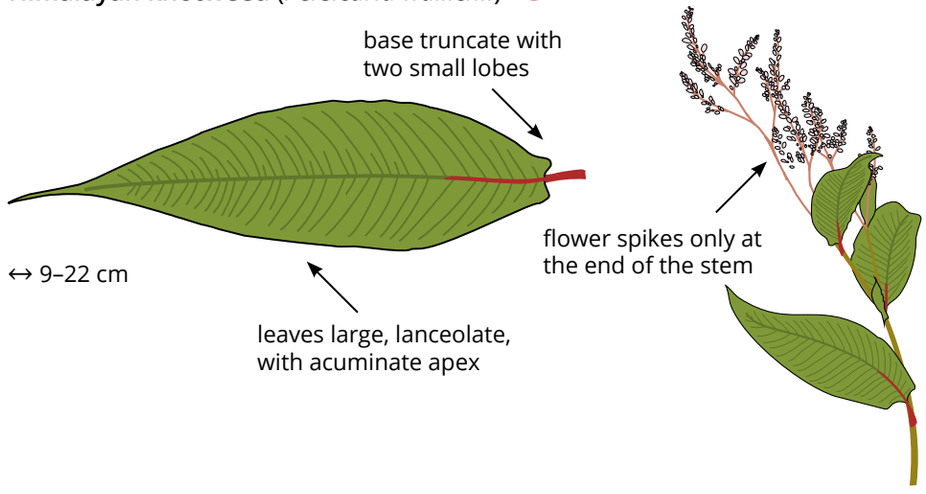
NATIVE RANGE:

Asia (southwest China, India, Afganistan)

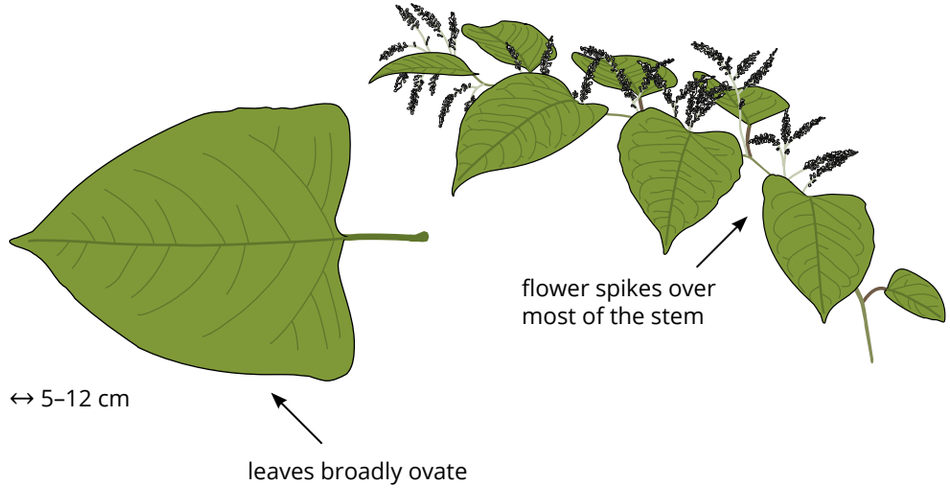
PATHWAYS:

horticulture

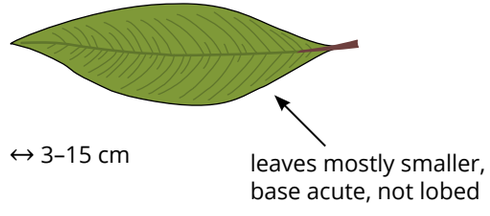
Himalayan knotweed (*Persicaria wallichii*) AS



Japanese knotweed (*Fallopia japonica*) AS



European native knotweeds (*Polygonum* spp.) ES



Giant knotweed

IAP

Fallopia sachalinensis (F. Schmidt) Ronse Decr.

Cordate leaf base

Inflorescence

↥ 2–4 m

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Herbaceous perennial with strong, extensively spreading rhizomes, forming large clonal colonies. The stem is hollow and jointed. Leaves are up to 40 cm long, thin, slightly rough to the touch, with a cordate base and a few hairs on the veins on the underside. Flowers are small and whitish with five tepals, borne in dense, drooping clusters.

HABITAT: Growing on forest edges and in forest clearings, on ruderal sites (embankments and roadsides).

STATUS: Widespread and common over Europe, with most records from the United Kingdom and Germany.

SIMILAR SPECIES: Japanese knotweed (*F. japonica*) and the hybrid between Japanese and giant knotweed – Bohemian knotweed (*Fallopia* x *bohemica*) – are both much lower. Japanese knotweed grows up to 2 m, and Bohemian knotweed is only slightly taller. Leaves of Japanese knotweed are up to 12 cm long, slightly longer than broad, with a truncate base. Leaves of Bohemian knotweed are up to 30 cm long and have a slightly cordate base.

TAXONOMY:

Polygonaceae

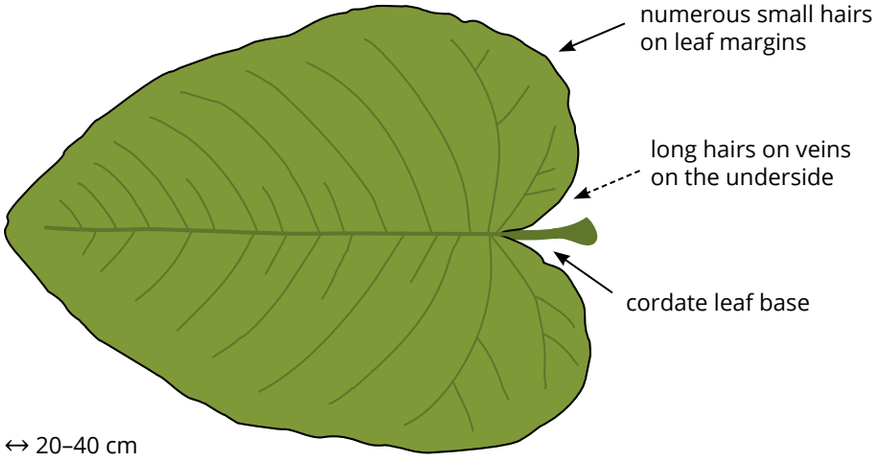
NATIVE RANGE:

East Asia

PATHWAYS:

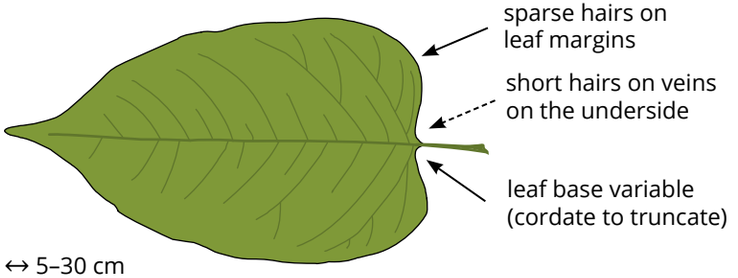
horticulture

Giant knotweed (*Fallopia sachalinensis*) AS



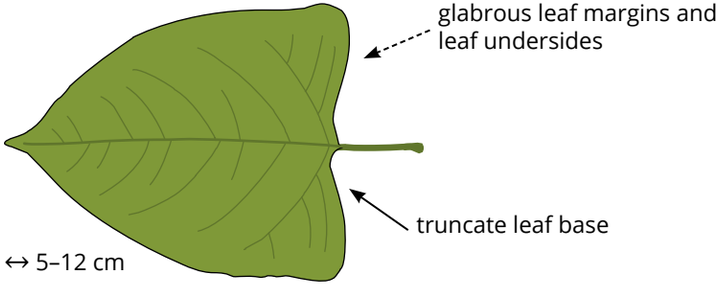
↔ 20–40 cm

Bohemian knotweed (*Fallopia* x *bohemica*) AS



↔ 5–30 cm

Japanese knotweed (*Fallopia japonica*) AS



↔ 5–12 cm

Garden lupine

OBS

Lupinus polyphyllus Lindl.

Papilionaceous flower

Fruits

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 50–150 cm

DESCRIPTION: Herbaceous perennial with unbranched stems. Leaves have long stalks and are palmately divided into 10 to 15 lanceolate leaflets. These are 4–15 cm long and 1–3 cm broad. Flowers are borne in erect, terminal racemes. Flowers are papilionaceous, pink to purple. Fruits are pods 2.5–6 cm long with oval seeds.

HABITAT: Roadsides, forest edges, stream banks, railway, embankments and close to human settlements. Within its introduced range, it grows especially on silicate soils in the montane zone.

STATUS: Widespread all over Europe but mostly absent in the Mediterranean area.

SIMILAR SPECIES: From a distance, certain blue-flowered monkshood species (A*conitum* sp.) appear similar. They can be easily distinguished by their flower- and leaf shape. In monkshoods, leaves are palmately divided into 3 to 7 segments with leaf margins deeply incised and bearing a few large teeth.

TAXONOMY:

Fabaceae

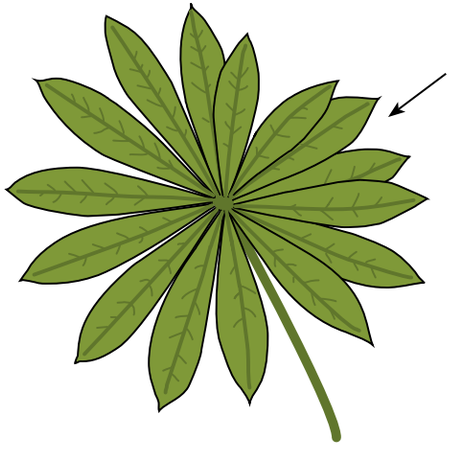
NATIVE RANGE:

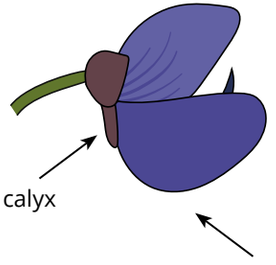
North America

PATHWAYS:

horticulture

Garden lupine (*Lupinus polyphyllus*) AS

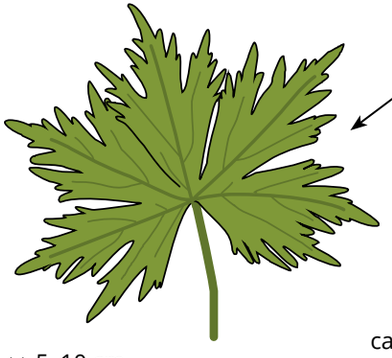




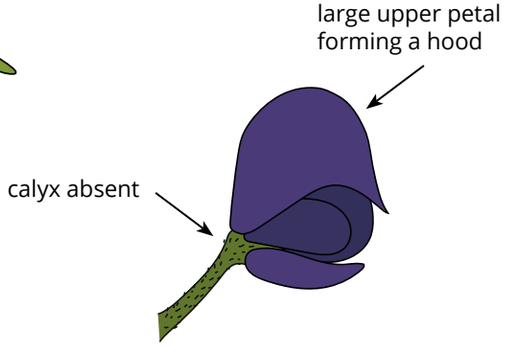
↔ 7–15 cm

papilionaceous flower: above banner, two winged petals and below keel

Monkshood (*Aconitum napellus*) ES



↔ 5–10 cm



Himalayan balsam

Impatiens glandulifera Royle

Glanular hairs on stalks

Flowers and a fruit

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 2 m (rarely to 4 m)

DESCRIPTION: A tall annual plant with a hollow, glabrous, jointed, fleshy stem. Leaves are opposite, in the upper part in whorls of three and are ovate to lanceolate with serrated margins. Leaf stalks bear several thick glandular hairs. Flowers are 2–4 cm wide, borne in racemes with purple or pink (sometimes almost white) petals. The two side petals are fused into a hood, the other three are single. Spur enlarged in the first part, tapering towards a narrow end. Fruits are capsules with multiple seeds. Ripe fruits split open, explosively discharging their seeds.

HABITAT: Growing on river banks, ditches, shady sites on the edge of meadows, moist forests and floodplain areas.

STATUS: Widespread all over Europe but practically absent in the Mediterranean area.

SIMILAR SPECIES: Balfour's touch-me-not (*Impatiens balfourii*), another ornamental balsam species, is found increasingly often in nature. The flower is bi-coloured, with a lighter upper half and with a gradually tapering spur. Garden balsam (*Impatiens balsamina*) has a very narrow spur which is inflexed in its terminal section.

TAXONOMY:

Balsaminaceae

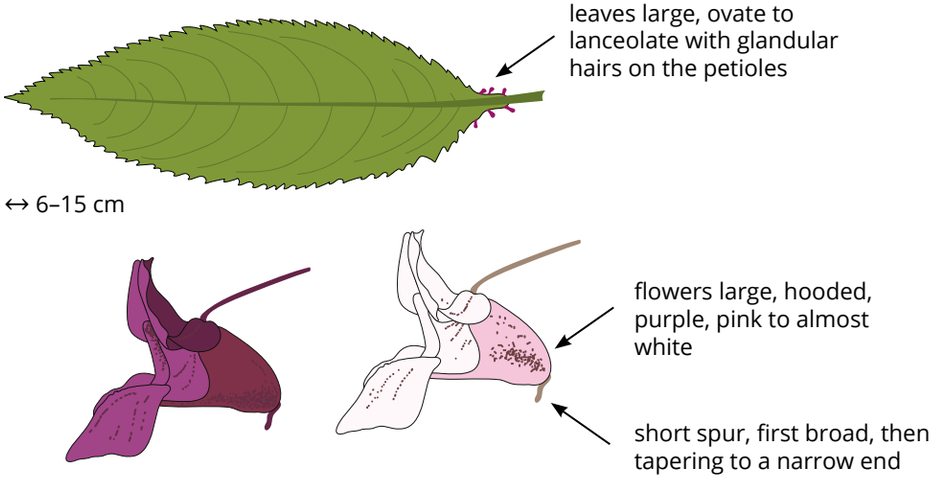
NATIVE RANGE:

Central Asia (Himalayas)

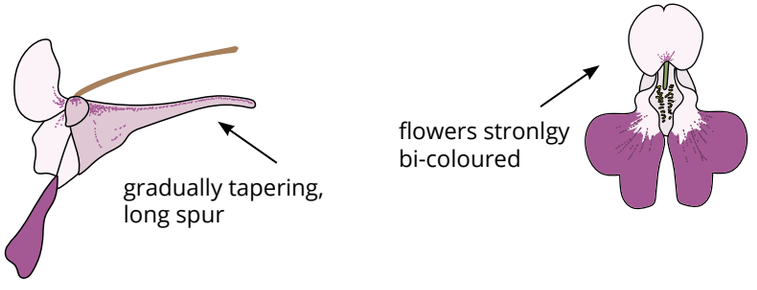
PATHWAYS:

horticulture, bee plant

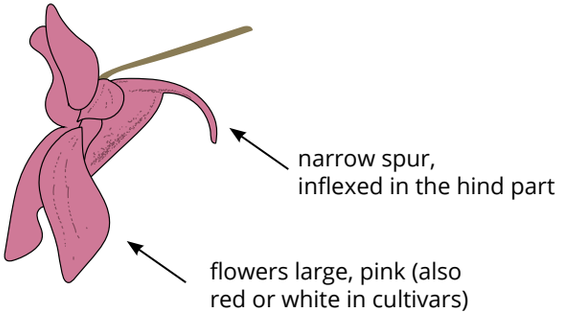
Himalayan balsam (*Impatiens glandulifera*) AS



Balfour's touch-me-not (*Impatiens balfourii*) AS



Garden balsam (*Impatiens balsamina*) AS



Small balsam

Impatiens parviflora DC.

A flower

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 30–60 cm (rarely to 1 m)

DESCRIPTION: An annual plant with a fleshy, glabrous, branched stem. Leaves spiralling, broadly lanceolate. Leaf margin finely serrated, with pink tips on the teeth. Pale yellow flowers with a darker throat and measuring 1-2 cm including the straight spur, are held in loose racemes at the tip of stalks. Fruits are club-shaped capsules, 1.5–2 cm long.

HABITAT: Shady sites along forest edges and in the understory in moist forests, also in shady ruderal sites.

STATUS: Widespread all over Europe but practically absent in the Mediterranean area.

SIMILAR SPECIES: European native touch-me-not balsam (*Impatiens noli-tangere*) also has yellow flowers, but these are brighter yellow and larger, 2–3 cm across, and have a recurved spur. In Europe, jewelweed (*I. capensis*), is increasingly becoming established. This species is similar to touch-me-not balsam in most respects, but has orange, rather than yellow flowers. Both species have toothed leaf margins with tiny white tips on the teeth.

TAXONOMY:

Balsaminaceae

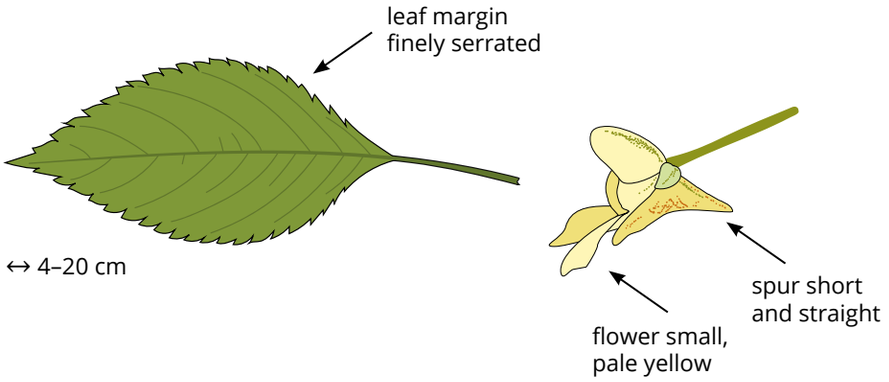
NATIVE RANGE:

Central Asia

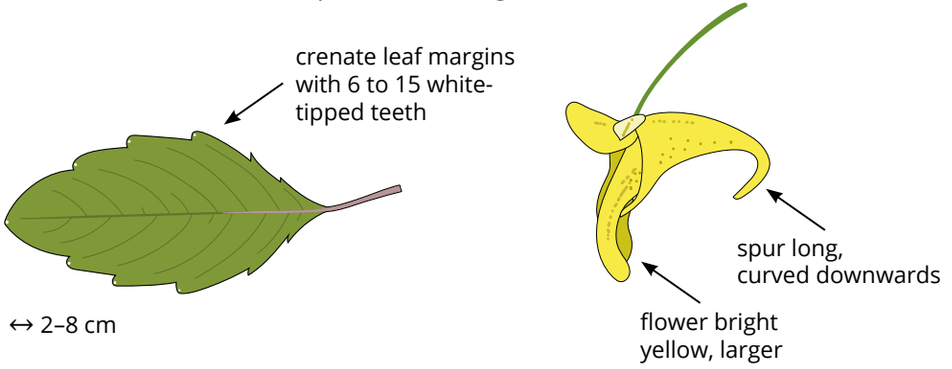
PATHWAYS:

horticulture

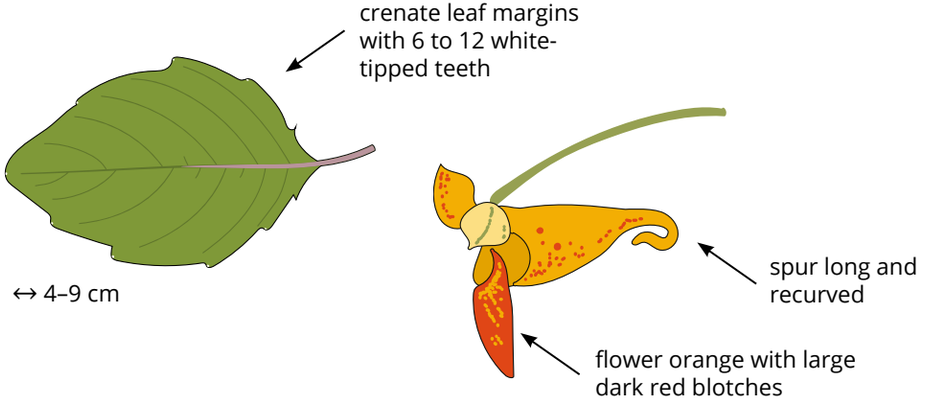
Small balsam (*Impatiens parviflora*) AS



Touch-me-not balsam (*Impatiens noli-tangere*) ES



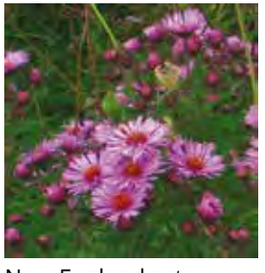
Jewelweed (*Impatiens capensis*) AS



North American asters

Symphyotrichum spp.

New York aster



New England aster

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ up to 150 cm

DESCRIPTION: Up to 1.5 m tall, branched herbaceous perennials. Leaves are narrow lanceolate to ovate-lanceolate, with acuminate apex. Leaf margin entire or finely serrated. In some species, the leaf base has small lobes. Leaves and stem may be glabrous or pillose. On each stem there are several flower heads with yellow disc florets in the centre and white, purple or pink ray florets along the edge, depending on the species. Fruits are pillose or glabrous achenes bearing a pappus, which enables wind dispersion.

HABITAT: Ruderal sites, forest edges, scrubland, river banks, dykes and disused quarries.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: At least three alien aster species in Europe have purple ray florets. Smooth blue aster (*S. laeve*) has glabrous stems and appressed involucral bracts. New York aster (*S. novi-belgii*) has more ray florets and longer, spreading involucral bracts. New England aster (*S. novae-angliae*) is more pillose with a larger number of ray florets. All European native asters are much lower. White flowered asters are presented on pages 127–128.

TAXONOMY:

Asteraceae

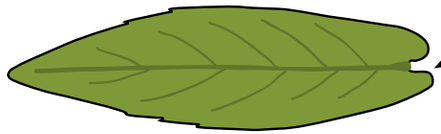
NATIVE RANGE:

North America

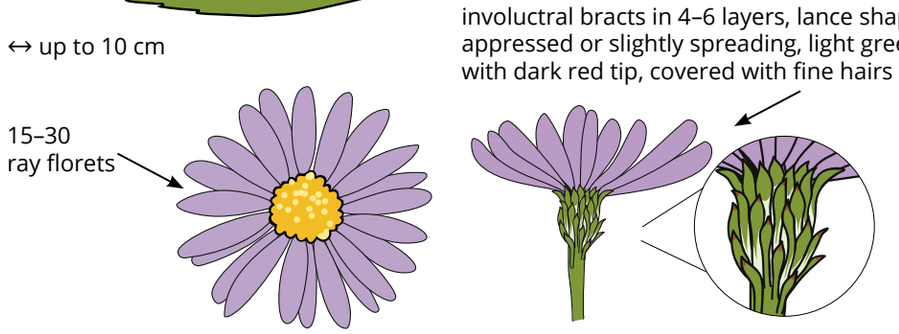
PATHWAYS:

horticulture

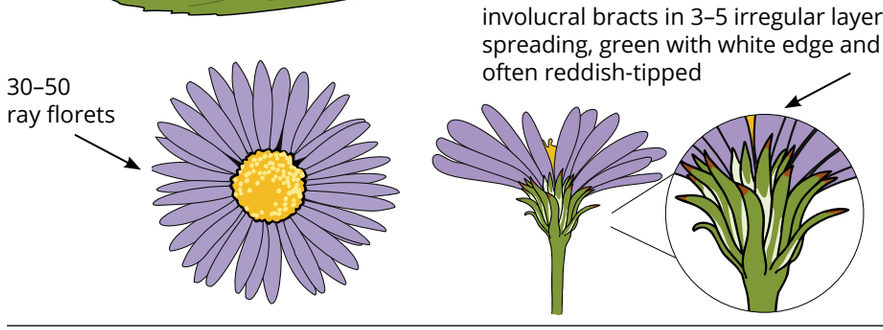
Smooth blue aster (*Symphyotrichum laeve*) AS



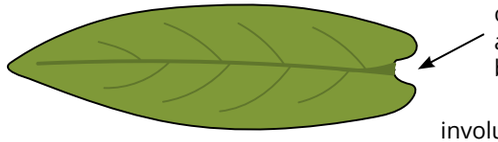
↔ up to 10 cm

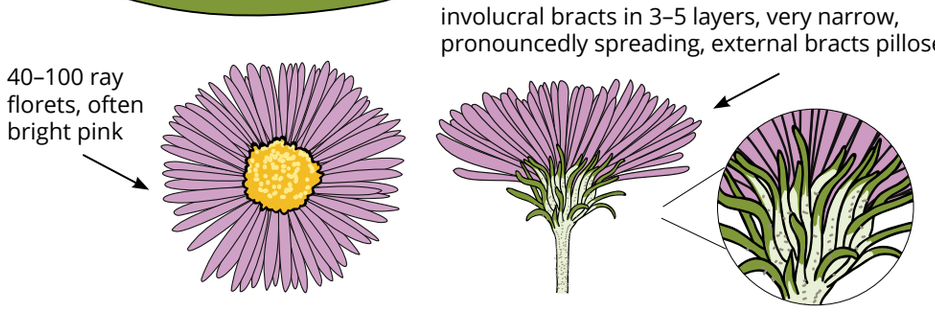


New York aster (*Symphyotrichum novi-belgii*) AS



New England aster (*Symphyotrichum novae-angliae*) AS





Annual fleabane

Erigeron annuus (L.) Pers. [s. l.]

Leaf rosette

Flower head

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 40–150 cm

DESCRIPTION: Annual, or often bi-annual herbaceous plant with an erect, branching, pillose stem. Leaves are light green, pillose on both sides. Lower leaves obovate, with petioles, up to 10 cm long. Upper leaves are lanceolate to linear, with entire to serrated margins, up to 9 cm long and 2 cm wide. White to pink ray florets and yellow disc florets together form 15–20 mm wide flower heads. Achenes are 1–1.5 mm long with hairy tufts.

HABITAT: Irregularly mown meadows, fields, abandoned arable fields, ruderal sites, gravel banks, road edges and lawns.

STATUS: Widespread all over Europe.

SIMILAR SPECIES: Among the alien asters with white ray florets, panicled aster (*S. lanceolatum*) and Tradescant's aster (*S. tradescantii*) also occur in Europe. These species can be distinguished by leaf shape, the number of ray florets and the placement and colour of the involucral bracts (see drawings on the right). European native scentless chamomile (*Matricaria perforata*) has similar flower heads, but leaves are pinnately compound with narrow linear leaflets.

TAXONOMY:

Asteraceae

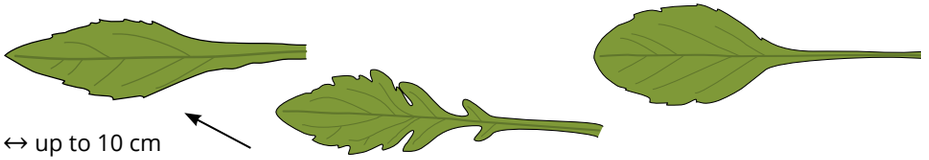
NATIVE RANGE:

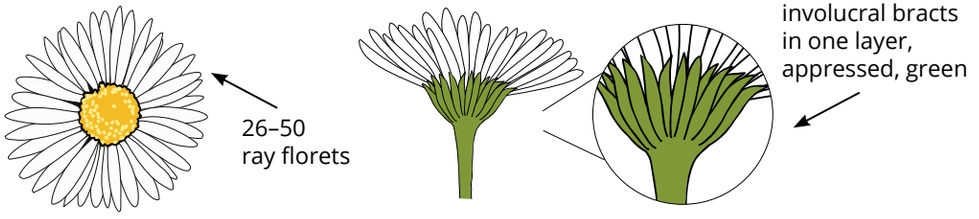
North America

PATHWAYS:

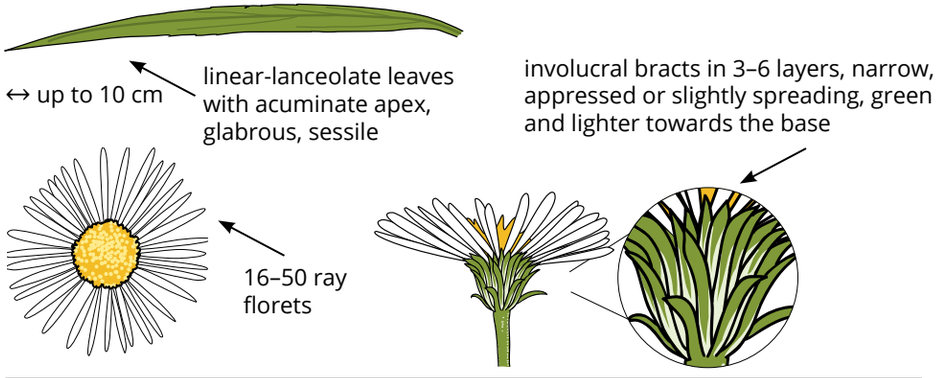
stowaway

Annual fleabane (*Erigeron annuus*) AS

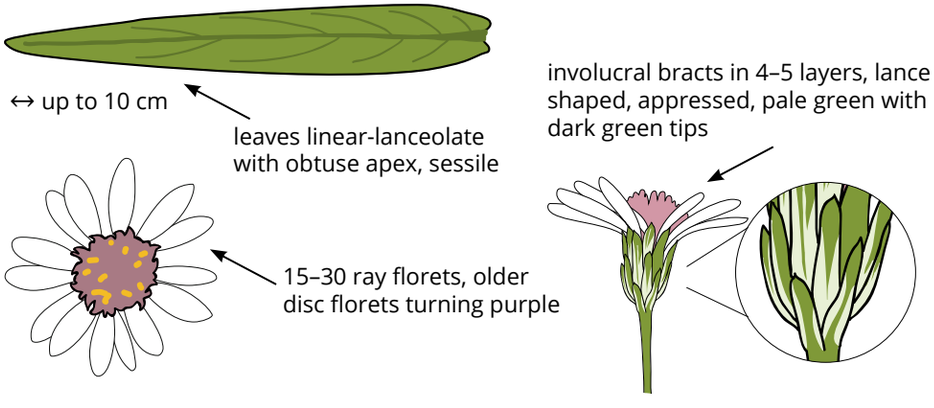




Panicled aster (*Symphyotrichum lanceolatum*) AS



Tradescant's aster (*Symphyotrichum tradescantii*) AS



Candelabra thistle

Cirsium candelabrum Griseb.

Drooping flowerheads

Leaf rosette

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↥ 1.5–2 m

DESCRIPTION: Herbaceous plant with a markedly branched stem which develops from the first year leaf rosette. The whole plant is very spiny. Leaves are shiny, light green, spinose, with yellowish-white (almost translucent) spines on the margins. Small flowers are clustered in pale yellow, drooping flower heads 1.5–2 cm wide. The fruit is a small achene, up to 5 mm long with a pappus 13–16 mm long, dispersed by the wind.

HABITAT: Dry, rocky soils, especially in montane areas and along roads. For now, within its introduced range, it is appearing on construction sites, roadsides and sometimes in open forests.

STATUS: In recent years found in Croatia and Slovenia. Native to southeast Europe (see the circle on the map).

SIMILAR SPECIES: Some other species of thistles (*Cirsium* spp. and *Carduus* spp.) are similar. European native yellow thistle (*Cirsium erisithales*) has similar drooping yellow flower heads but the stem is mostly unbranched and has only few leaves in the upper part.

TAXONOMY:

Asteraceae

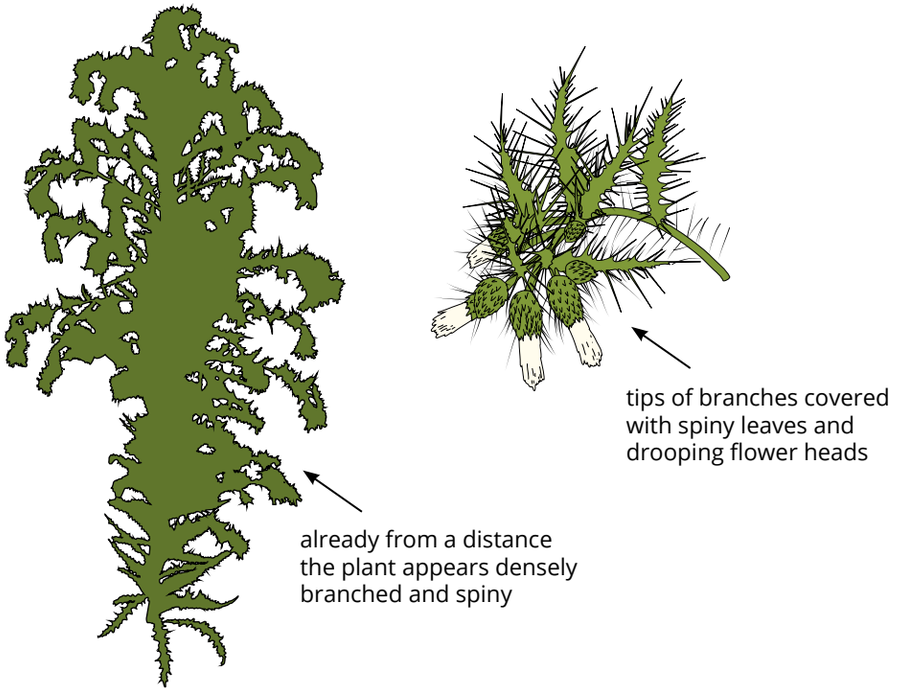
NATIVE RANGE:

south eastern Europe

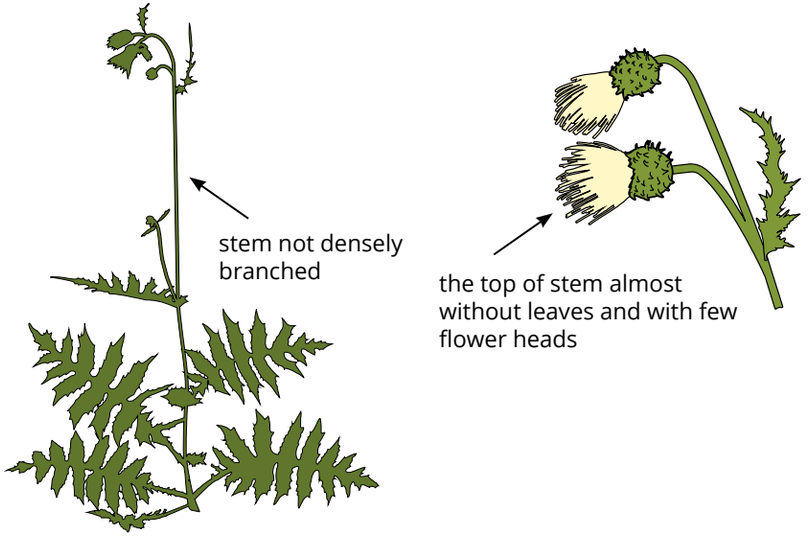
PATHWAYS:

stowaway

Candelabra thistle (*Cirsium candelabrum*) AS



Yellow thistle (*Cirsium erisithales*) ES



Giant Hogweed

Heracleum mantegazzianum Sommier & Levier

Purple spots on stem

Dentate leaf margin

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

↕ 2–3 m (up to 5 m)

DESCRIPTION: A very large monocarpic herbaceous plant. Leaves are 1–1.7 m broad, twice pinnately divided and deeply incised. Leaf margin dentate with sharp white-tipped teeth. Stems are green with many scarlet spots and are covered with stiff hairs. Numerous white to greenish-white flowers are borne in large umbrella-shaped clusters. Dispersal is exclusively by seeds, which can be transported by water. People also unintentionally spread seeds by transporting soil. The whole plant is toxic to touch!

HABITAT: Forest margins, riparian areas and ruderal sites.

STATUS: Widespread and common in western and parts of Central Europe. Only few observations in the Mediterranean countries.

SIMILAR SPECIES: European cow parsnip (*H. sphondyllium*) grows to a maximum of 2 m height, has serrated leaf margins with rounded teeth and a green to reddish, unspotted stem. Wild angelica (*Angelica sylvestris*) and giant hog fennel (*Peucedanum verticillare*) have entirely reddish stems and leaves with a different shape. The alien Persian hogweed (*H. persicum*) and Sosnowsky's hogweed (*H. sosnowskyi*) are both very similar.

TAXONOMY:

Apiaceae

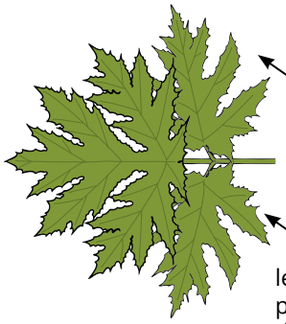
NATIVE RANGE:

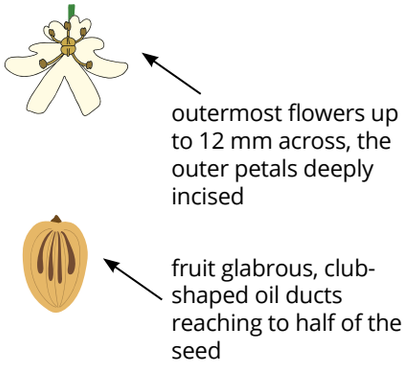
Western Asia (Caucasus)

PATHWAYS:

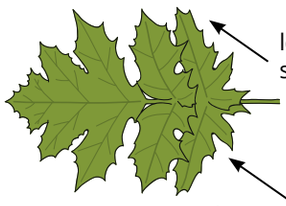
horticulture

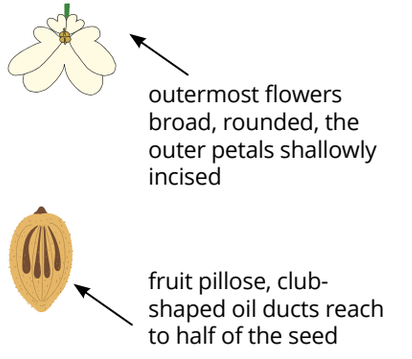
Giant hogweed (*Heracleum mantegazzianum*) AS BIO



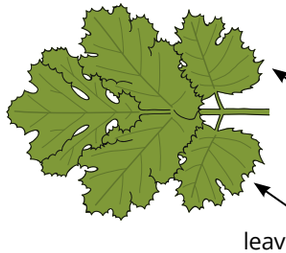


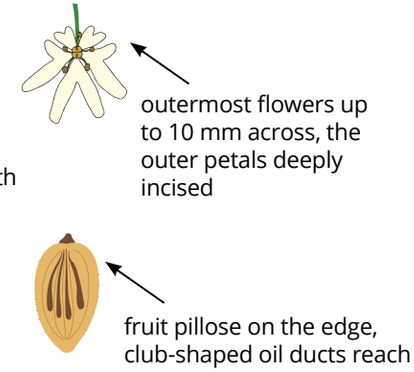
Persian hogweed (*Heracleum persicum*) AS BIO



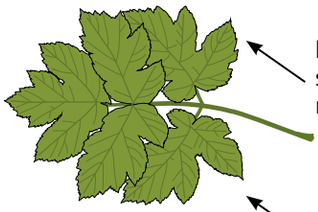


Sosnowsky's hogweed (*Heracleum sosnowskyi*) AS BIO





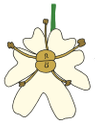
Cow parsnip (*Heracleum sphondyllium*) ES



leaf margin serrated with rounded teeth

leaves pinnately divided, not deeply incised

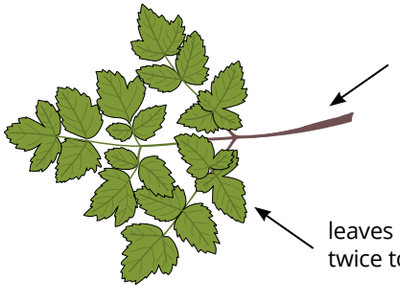
↔ 30–150 cm



outermost flowers have larger petals, outer petals deeply incised

fruit glabrous, oil ducts straight, reach three-quarters of the way along seed

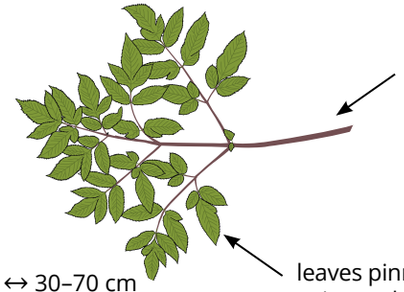
Giant hog fennel (*Peucedanum verticillare*) ES



leaf petioles and stem uniform reddish

leaves pinnately divided twice to three times

Wild angelica (*Angelica sylvestris*) ES



leaf petioles and stem uniform reddish

leaves pinnately divided twice to three times

↔ 30–70 cm

Fungi and bacteria

Authors: Dušan Jurc, Nikica Ogris, Michelle Cleary

Phytophthoras

PH A2

Phytophthora spp.

Dieback of bark

Necrosis on leaves

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The genus *Phytophthora* has over 140 species. The most common native species are *P. citricola* and *P. cambivora*. *P. ramorum* which causes leaf blight and dieback, was first found in Europe in 1997 and is listed as a quarantine pest. Symptoms include the dieback of shoots and twigs, necrotic lesions on leaves and lesions on the bark, which exude a dark fluid. Infections cause dieback of various woody plants.

HOST PLANTS: Host species in forests include oaks (*Quercus* spp), beech (*Fagus sylvatica*), sweet chestnut (*Castanea sativa*), sycamore (*Acer pseudoplatanus*), common ash (*Fraxinus excelsior*), guelder rose (*Viburnum opulus*), blueberry (*Vaccinium myrtillus*) and European larch (*Larix decidua*).

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: All *Phytophthora* spp. cause similar symptoms on deciduous and coniferous trees. Identification is only possible in the laboratory. Exudates can also be caused by insects including wood-boring beetles. In this case, there are visible holes in the trees, galleries, bore-dust, sawdust, larvae or adult insects.

TAXONOMY:

Chromista, Peronosporaceae

NATIVE RANGE:

depends on species

PATHWAYS:

spores transported with water, soil, saplings, shoes, vehicles

Heterobasidion root disease

PH A2

Heterobasidion irregulare Garbel. & Otrosina

Fruiting body on a stump

Fruiting body

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The fruiting body is flattened, initially hemispherical, elongated, multi-annual, 1–30 cm wide. The upper layer is uneven, first reddish-brown, later on turning darker. With age, it eventually becomes black and only the growing edges maintain a white colouration. The hymenium on the underside is initially white, later off-white to yellowish-brown and has round or strongly elongated, irregularly-shaped pores (7.3 pores/mm^2). In cross-section, the fruiting body shows several distinct layers.

HOST PLANTS: Infects coniferous trees. It rarely forms fruiting bodies on live trees, but often on tree stumps of infected trees and on dead or cut trees.

STATUS: Present in an area of about 100 km around the shore of Tyrrhenian Sea in Italy.

SIMILAR SPECIES: Three related fungi cause root diseases in Europe: *Heterobasidion annosum*, *H. parviporum* and *H. abietis*. They can be identified with a detailed investigation of their morphological characters (number of pores per mm^2, the composition of fruiting bodies, shape of the edge, presence of hairs) and molecular techniques.

TAXONOMY:

Russulales, Bondarzewiaceae

NATIVE RANGE:

North America

PATHWAYS:

spores are transported with infected wood, wind and by insects

Chestnut blight

PH A2

Cryphonectria parasitica (Murrill) M.E. Barr

Mycelium under the bark

Bark with fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: This tree disease is typically virulent, but can appear in a non-virulent form when the fungus is infected by a virus. The virulent form progresses rapidly, leading to the dieback of infected trees. The first symptom is a change in the colour of the bark, which becomes darker with orange spots. Below the bark, there are fan-shaped mycelia, while pin-sized orange to brick red fruiting bodies develop on the external surface. The hypovirulent form causes only minor cracks in the bark and minor hypertrophy of branches and trunk.

HOST PLANTS: Sweet chestnut (*Castanea sativa*). Oaks (*Quercus* spp.) may be infected when they grow in the vicinity of infected chestnuts.

STATUS: The disease is present across the entire distribution range of sweet chestnut.

SIMILAR SPECIES: *Gnomoniopsis smithogilvyi* causes chestnut brown rot on chestnut fruits and can also result in damage to bark. It has grey fruiting bodies and white spores and is progressing more slowly than the chestnut blight.

TAXONOMY:

Diaporthales, Cryphonectriaceae

NATIVE RANGE:

East Asia (China & Japan)

PATHWAYS:

spores are transported with saplings and wood, also spread by insects and wind

Gnomoniopsis smithogilvyi

Charcoal disease of oak

Biscogniauxia mediterranea (De Not.) Kuntze

Sporocarp on Turkey oak

Sporocarp on manna ash

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Endophyte, often present in healthy tissue but becoming parasitic in periods of drought or heat stress. The bark rots, cracks and peels in infected trees. Charcoal black fruiting bodies develop under the bark during the following season. Fruiting bodies are elongated with a raised edge, 1.8–7 cm long (sometimes up to 40 cm). Several fruiting bodies can merge together.

HOST PLANTS: Primarily cork oak (*Quercus suber*), Turkey oak (*Q. cerris*) and downy oak (*Q. pubescens* agg.). Less often and especially in periods of drought and heat stress, also manna ash (*Fraxinus ornus*), maples (*Acer* spp.) and other deciduous trees.

STATUS: Until the year 2003, it was known as a common cause of charcoal disease of oak trees in the Mediterranean region. Due to climate change, it is increasing in other parts of Europe.

SIMILAR SPECIES: *Biscogniauxia nummularia,* which causes beech tarcrust, and other related species.

TAXONOMY:

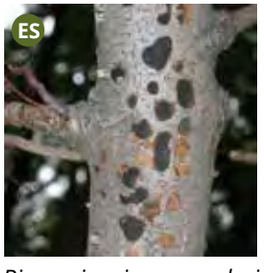
Xylariales, Xylariaceae

NATIVE RANGE:

southern Europe

PATHWAYS:

spores, plant material



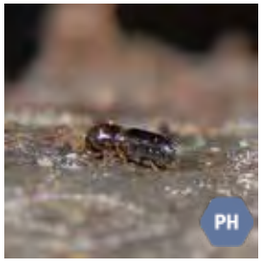
Biscogniauxia nummularia

Thousand cankers disease

PH A2

Geosmithia morbida M. Kolařík, E. Freeland, C. Utley & Tisserat

Damaged bark



Walnut twig beetle

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: This disease can be recognised by the wilting and drying of leaves. It first appears on some branches but can quickly spread to the entire canopy. Infected trees die in one to two years. On the bark of infected trees, exit holes of walnut twig beetles (*Pityophthorus juglandis*) can be found, which are less than 1 mm wide. If the bark is peeled off with a knife, decaying brown bark is visible in the form of numerous lenticular necroses which are up to 20 cm long. In the middle of these necrotic lesions we can find beetle tunnels, and during the vegetation season usually also tiny beetles, 1,5-2 mm.

HOST PLANTS: Primary host plants are black walnut (*Juglans nigra*) and common walnut (*J. regia*).

STATUS: In Europe only reported from Italy.

SIMILAR SPECIES: No other species cause similar damage symptoms of damage on walnut trees.

TAXONOMY:

Hypocreales, Incertae sedis

NATIVE RANGE:

North America

PATHWAYS:

spontaneous spread, branches, trunks, bark

Sooty bark disease

Cryptostroma corticale (Ellis & Everh.) P. H. Greg. & S. Waller

Brown soot-like spores

Coloured heartwood

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The first symptom of the disease is wilting and dieback of the canopy. The bark peels off in rectangular pieces and long strips. Underneath the peeling bark, there may be a large quantity of soot-like brown-black spores, which are dispersed by wind. When spores are washed down by the rain, the lower part of the trunk and nearby plants are coloured black. Due to the infection, the heartwood colours greenish-brown. The fungus spreads from the wood towards the bark. It is usually non-pathogenic, but causes damage to maples in periods of drought and heat stress.

HOST PLANTS: All species of maples (*Acer* spp.) and birch (*Betula* spp.). Sycamore (*A. pseudoplatanus*) is the most susceptible.

STATUS: The disease has been found locally in several European countries.

SIMILAR SPECIES: When large amounts of soot-like spores are present, it cannot be mistaken for any other disease. Heartwood may be discoloured due to infections with a variety of wood-rotting fungi.

TAXONOMY:

Xylariales, Xylariaceae

NATIVE RANGE:

North America

PATHWAYS:

spores are transported with wind, timber and bark

Eutypella canker of maple

Eutypella parasitica R. W. Davidson & R. C. Lorenz

White mycelium

Canker wound

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The most obvious symptom of Eutypella canker of maple is a canker – a deformation of the trunk, which is often elliptic in shape, with a dead branch at its centre. White to creamy-white mycelial fans grow beneath the bark. Black fruiting bodies develop in the middle of the wound (perithecia, of which we see only the black necks). In the middle of the wound, the wood may be degraded, but bark persists on the tree for a long time. Early stages of the infection are difficult to recognise as the first fruiting bodies develop only seven years after the initial infection.

HOST PLANTS: Infects all maple species (*Acer* spp.). Often coalesces into infection centres.

STATUS: Locally present in Central European countries.

SIMILAR SPECIES: Similar symptoms are caused by species of the genus *Nectria*, by *Botryosphaeria dothidea,* and brittle cinder (*Kretzschmaria deusta*). See the facing page for photographs.

TAXONOMY:

Xylariales,
Diatrypaceae

NATIVE RANGE:

North America

PATHWAYS:

spores, seedlings,
timber & bark

Nectrias (*Nectria* spp.) ES AS

Botryosphaeria dothidea on Norway maple ES

Brittle cinder (*Kretzschmaria deusta*) ES

Pitch canker of pine

PH A2

Fusarium circinatum Nirenberg & O'Donnell

Resin-soaked wood

Dieback of shoots

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The fungus *F. circinatum* infects the bark of pine trees and causes dieback, resin exudates and canker wounds. The woody tissue beneath the canker is soaked with resin and is coloured yellow. In saplings, the lower part of the stem is thickened and exudes excessive resin while beneath the bark, the wood is dark brown and soaked with resin. In older trees, it may also cause dieback of the tips of affected branches. Needles wilt and initially colour light green, then reddish-brown and are eventually shed. Trees are infected by spores, which are carried by wind and insects. The fungus can only enter trees through wounds.

HOST PLANTS: All species of pines (*Pinus* spp.), sometimes also in other conifers.

STATUS: Present in Spain and Portugal, where it is more common in warm, moist areas.

SIMILAR SPECIES: Sphaeropsis shoot-killing of pine (*Diplodia pinea*), Brunchorstia dieback of conifers (*Gremmeniella abietina*), shoot shedding of pine (*Cenangium ferruginosum*) (see page 145), Atropellis canker (*Atropellis* spp.) and pine-shoot beetles (*Tomicus* spp.).

TAXONOMY:

Xylariales, Xylariaceae

NATIVE RANGE:

North America

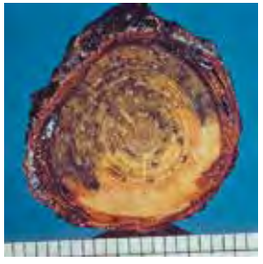
PATHWAYS:

spores, seeds, seedlings, timber, bark & insects

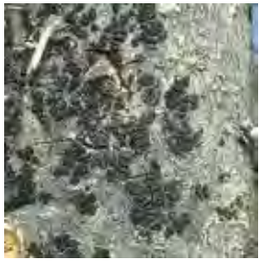
Atropellis canker

PH A1

Atropellis piniphila (Weir) M. L. Lohman & E. K. Cash



Black stains in the wood



Black fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The disease causes slow dieback of the bark of various pine species. Thinner infected branches usually die back. There are often resin drops on the edge of infected areas. Slowly spreading canker wounds form on the trunk, mostly at branch axils. In the bark, the fungus grows about 5 cm/year vertically and 0.6 cm/year horizontally, and thus the wound becomes very elongated. The wood acquires characteristic bluish-black stains. On the surface of the wound small, black, disc-shaped and stalked fruiting bodies (apothecia) develop.

HOST PLANTS: All species of pines (*Pinus* spp.).

STATUS: The species is listed as a quarantine pest. The most likely pathway is through the import of wood, bark and pine seedlings from North America.

SIMILAR SPECIES: Sphaeropsis shoot-killing of pine (*Diplodia pinea*) has small, round, black fruiting bodies (see opposite page). Shoot shedding of pine (*Cenangium ferruginosum*), which does not lead to the formation of cankers, has light brown disc-shaped fruiting bodies, which initially have black outer edges and later become entirely black.

TAXONOMY:

Helotiales, Godroniaceae

NATIVE RANGE:

North America

PATHWAYS:

spores, bark, timber & live plants

Cenangium ferruginosum

White pine blister rust

Cronartium ribicola J. C. Fisch.

Fruiting bodies on Weymouth pine

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: This disease can be recognised by yellowish-orange blister-like swellings, 0.5 to 2 cm long, which appear in springtime on the bark of pines. Inside the swellings there are numerous orange spores, which fall out of the fruiting bodies. At other times of the year, only a deformation of infected parts of the trunk or branches is visible as a resin-exuding wound. Spores are carried by the wind to the leaves of various currant species, where a larger number of small, orange fruiting bodies are formed in autumn. In autumn, the dark brown winter fruiting bodies appear.

HOST PLANTS: Five-needle pine species (especially Weymouth pine, *Pinus strobus*) and currants (especially black currant, *Ribes nigra*) are susceptible.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: *Cronartium flaccidum*, causes pine stem rust. This disease has identical symptoms, but it affects different host plants and is specific to two-needle pines including Scots pine, (*P. sylvestris*), black pine (*P. nigra*), Aleppo pine (*P. halepensis*) and mountain pine (*P. mugo*)

TAXONOMY:

Pucciniales, Cronartiaceae

NATIVE RANGE:

Alps, Siberia

PATHWAYS:

spontaneous spread

Dutch elm disease

Ophiostoma novo-ulmi Brasier

Brown streaking in the wood

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: This fungus causes a disease of water -conducting tissues of trees (tracheomycosis). Because water conducting cells are blocked, the branches wilt and eventually die back. The fungus quickly spreads through the wood and infected trees die back within a few years. A typical disease symptom is a brown streaking in the previous year's annual ring of the wood in the affected branches. The infection is often accelerated by attacks by elm bark beetles (*Scolytus* spp.). Adult beetles carry the fungal spores on their bodies and in their faeces, which they spread to healthy trees in the surroundings.

HOST PLANTS: All elm species (*Ulmus* spp.).

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: Similar symptoms can appear with Verticillium wilt which is caused by fungi of the genus *Verticillium* (*V. alboatrum* and *V. dahliae*).

TAXONOMY:

Ophiostomatales, Ophiostomataceae

NATIVE RANGE:

East Asia (China)

PATHWAYS:

spores are spread by elm bark beetles

Canker stain of plane

PH A2

Ceratocystis platani (J. M. Walter) Engelbr. & *T. C. Harr.*

Lenticular necrosis of bark

Cracks in the infected bark

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Infected trees can be recognised from a distance because parts of the canopy die back during the vegetative season. Usually, leaves of affected trees are smaller compared to those of healthy plane trees. Infected areas of the bark appear as dark grey patches with a paler edge. The wood underneath these patches is dark brown to purple. These lenticular necrotic patches may coalesce to form extensive lesions. In cross-sections of infected wood, a bluish staining is visible, which extends radially into the sapwood.

HOST PLANTS: This fungus infects all plane species (*Platanus* spp.).

STATUS: The disease, which is listed as a quarantine pest, is especially widespread across the Po-plain in Italy.

SIMILAR SPECIES. No other species causes rapid dieback in plane trees, combined with a dark brown to purple staining of the wood. Drying of leaves and shoots and dieback of bark can also be caused by anthracnose of plane (*Apiognomonia veneta*) or phytophthoras. In these cases, the infection usually spreads upwards from the ground. See the facing page for example photographs.

TAXONOMY:

Incertae sedis, Microascales

NATIVE RANGE:

North America

PATHWAYS:

spores are spread on sawing tools, by wind and by insects

Anthracnose of plane (*Apiognomonia veneta*) **or phytophthoras** (*Phytophtora* spp.)

Anthracnose of plane (*Apiognomonia veneta*)

Symptoms of anthracnose of plane include brown spots on leaves and, with extensive drought stress, also dieback of bark and canker wounds.

Ash dieback

Hymenoscyphus fraxineus (T. Kowalski) Baral

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

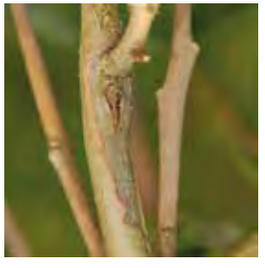
DESCRIPTION: Symptoms of this diseases include brown lesions on leaves and leaf-petioles, which are the entry points of the fungi. Later, the fungus infects bark and causes lesions and dieback of shoots. Oval lesions appear on the bark of the trunk, which quickly increase in size. Sometimes the tree does not die back but a canker is formed at the wound. Trees are often heavily infected and many branches die back but, at the same time, the tree also forms new shoots.

HOST PLANTS: Common ash (*Fraxinus excelsior*) and narrow-leaved ash (*F. angustifolia*), are particularly susceptible, while manna ash (*F. ornus*) is unaffected.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: Dieback of ash trees may also be caused by honey fungi (*Armillaria* spp.), which cause armillaria root disease. Weakened and dying trees are often attacked by ash bark beetles, for example *Leperesinus fraxini*.

Infection of leaves



Bark dieback

TAXONOMY:

Helotiales,
Helotiaceae

NATIVE RANGE:

East Asia (China, Korea, Japan)

PATHWAYS:

on sawing tools, dispersion by wind and insects

Honey fungus (*Armillaria* sp.) ES

Mycelium underneath dead bark in common ash.

Ash bark beetle (*Leperesinus fraxini*) ES

Ash bark beetle galleries in a common ash, which succumbed to ash dieback.

Canker of balsam fir

ALERT

Neonectria neomacrospora (C. Booth & Samuels) Mantiri & Samuels

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: In the first year after the infection, the bark of infected fir trees exudes excessive resin and starts to die back. Single branches can die back or even entire smaller trees. When the infection spreads to the bark, the tree attempts to overgrow the infection and a canker develops in successive years. In the second year after the infection, small, round, red fruiting bodies (perithecia) develop on dead bark, especially on the scars which are left by shed needles. The perithecia are more numerous in humid conditions.

HOST PLANTS: This fungus infects the bark of various fir species (*Abies* spp.). It can also infect Norway spruce (*Picea abies*) when these are growing in the vicinity of affected fir trees.

STATUS: Occurs locally in Northern and Western Europe.

SIMILAR SPECIES: The perithecia of flute canker of radiata pine (*Neonectria fuckeliana*) are macroscopically similar. Molecular analysis is necessary in order to distinguish these species. Also morphologically similar are also neonectria canker (*N. ditissima*) and coral spot (*Nectria cinnabarina*) which both, however, affect only deciduous trees.

TAXONOMY:

Hypocreales, Nectriaceae

NATIVE RANGE:

North America

PATHWAYS:

seedlings, wind, spontaneous spread

Sirococcus shoot blight

Sirococcus tsugae Castl., D.F. Farr & Stanosz, 2007

Drying shoots

Fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A tree disease which causes blights and dieback of branches. Needles discolour and become pale brown, branches die and dead needles fall off. Most affected are the tips of branches, which die back. Larger branches and trunks can develop cankers. Black fruiting bodies may be found on both dead needles and on cankers. Adult trees as well as young plants may be affected and seedlings and saplings may fail.

HOST PLANTS: This fungal disease affects cedars (*Cedrus* spp.) and hemlocks (*Tsuga* spp.).

STATUS: So far there have been sporadic records in the United Kingdom, Belgium and Germany.

SIMILAR SPECIES: The damage can be confused with infections by the fungus causing Sirococcus shoot dieback of spruce (*Sirococcus conigenus*). Laboratory analysis is necessary to confirm the identification.

TAXONOMY:

Diaporthales, Diaporthomycetidae

NATIVE RANGE:

North America

PATHWAYS:

seedlings and seeds, spores

Plane-tree powdery mildew

Erysiphe platani (Howe) U. Braun & S. Takam.

Early infection stage

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The disease can be recognised as white to ash-grey patches of mycelium on leaves. Infected leaves are wrinkled, deformed, stay smaller and fall off prematurely. Hyphae extend from the mycelium into the leaves, from which they withdraw nutrients. The mycelium surface is powdery due to the many conidia with which the fungi disperses. From the middle of summer onwards, tiny black spots develop on the mycelium. These are fruiting bodies with overwintering spores.

HOST PLANTS: Only infects the leaves of plane trees (*Platanus* spp.). Like all powdery mildews, it primarily infects the parts of the canopy which are exposed to the sun and where temperatures are higher.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: Sycamore lace bug (*Corythucha ciliata*) (see page 180) can cause leaves to yellow and fall off prematurely. The lace bugs leave a typical black frass. Adult lace bugs can be most easily found on the underside of leaves.

TAXONOMY:

Erysiphales, Erysiphaceae

NATIVE RANGE:

North America

PATHWAYS:

sawing tools, wind dispersion and insects

Dothistroma blight

PH

Dothistroma septosporum (Dorogin) M. Morelet & *D. pini* Hulbary

Dieback of needles

An infected needle with fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Dothistroma blight is caused by two morphologically indistinguishable species: *D. septosporum* in *D. pini*. Both fungi primarily affect pine trees. Red to reddish brown spots and bands appear on the tip of infected needles, followed by tiny black asexual fruiting bodies which break through the surface of the needles. In the end, the entire needles die and are shed prematurely. Needles of lower branches are often affected first. The disease then gradually spreads upwards to the crown and outwards along the branches. After several years of a severe infection, the affected tree may die.

HOST PLANTS: The most susceptible species include black pine (*Pinus nigra*), mountain pine (*P. mugo*), stone pine (*P. pinea*) and Scots pine (*P. sylvestris*).

STATUS: *D. septosporum* is locally present throughout Europe whereas *D. pini* has a more restricted distribution.

SIMILAR SPECIES: Brown spot needle blight (*Lecanosticta aricola),* Cyclaneusma needle-cast (*Cyclaneusma minus),* Sphaeropsis shoot-killing of pine (*Diplodia pinea)* and Lophodermium needle cast (*Lophodermium seditiosum*) are all similar.

TAXONOMY:

Capnodiales, Mycosphaerellaceae

NATIVE RANGE:

North- and Central America

PATHWAYS:

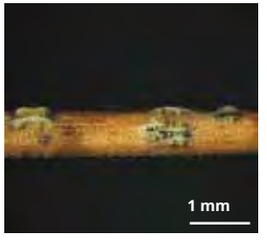
seedlings, spontaneous spread, rain, wind

Brown spot needle blight

PH A2

Lecanosticta acicola (Thüm.) Syd.

Needle browning



Black spots under epidermis

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The first symptoms of this disease are yellow spots on pine needles, which are sometimes filled with resin. These spots first appear by the end of summer. Later, these spots turn dark brown, and elongate, spreading to the tips of the needles and causing their dieback. In late autumn dense hyphae clusters, which look like raised black spots, appear beneath the epidermis of the dying needles. In moist weather, fruiting bodes are formed which discharge large numbers of spores in the form of an olive-green slime.

HOST PLANTS: Mountain pine (*Pinus mugo*) is highly susceptible while Scots pine (*P. sylvestris*) and Aleppo pine (*P. halepensis*) may also be affected but black pine (*P. nigra*) only rarely so.

STATUS: Locally present throughout Europe.

SIMILAR SPECIES: Dothistroma blight (*Dothistroma pini),* Cyclaneusma needle-cast (*Cyclaneusma minus),* Sphaeropsis shoot-killing of pine (*Diplodia pinea)* and Lophodermium needle cast (*Lophodermium seditiosum).*

TAXONOMY:

Capnodiales, Mycosphaerellaceae

NATIVE RANGE:

North- and Central America

PATHWAYS:

spontaneous spread, spread with hosts

Alder rust

Melampsoridium hiratsukanum S. Ito ex Hirats. f.

Summer fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Summer fruiting bodies (uredinia) of alder rust look like small orange pustules on the underside of leaves, which excrete orange coloured summer spores. These fruiting bodies can be so dense that they cover the entire underside of leaves and cause them to fall off prematurely. This fungus overwinters in the form of summer spores, or as mycelium inside alder buds. In Europe, it rarely forms winter fruiting bodies (telia) which form basidia with basidiospores. These infect larch (*Larix* spp.) trees on which spring spores develop in the following season.

HOST PLANTS: The disease is common on grey alder (*Alnus incana*), rarely also on common alder (*Alnus glutinosa*).

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: several related fungi cause rust on alder leaves: *Melampsoridium alni*, *M. betulinum* and *M. carpini*. For a certain identification, either microscopic analysis of summer fruiting bodies is needed or a molecular analysis.

TAXONOMY:

Pucciniales, Pucciniastraceae

NATIVE RANGE:

East Asia (China, Japan)

PATHWAYS:

probably with seedlings, spontaneous spread

Blueberry leaf rust

PH A2

Thekopsora minima (Arthur) Syd. & P. Syd.

Necrotic brown spots

Yellow-orange fruiting bodies

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The first symptom is the appearance of yellow spots on the upper sides of the leaves, which later progress to necrotic brown spots. These coalesce and eventually cover large parts of the leaf. Yellow-orange fruiting bodies develop on the undersides of leaves, and sometimes later also on fruits.

HOST PLANTS: The most commonly affected species are American blueberries (*Vaccinium corymbosa*) and other species from the heather family (Ericaceae). Native European blueberries (*V. myrtillus*) are not known to be affected. Hemlocks (*Tsuga* spp.) act as intermediate hosts.

STATUS: In Europe so far found in Germany, Belgium, the Netherlands and Portugal. Likely to spread with the trade in American blueberry saplings.

SIMILAR SPECIES: All other rusts on American blueberries, for example *Pucciniastrum vaccinii* are similar and microbiological analysis is needed to confirm identification.

TAXONOMY:

Pucciniales, Pucciniastraceae

NATIVE RANGE:

North America, Japan

PATHWAYS:

seedlings, short distance dispersion by wind

Pierce's disease of grapevines

PH A2

Xylella fastidiosa Wells et. al, 1987

Leaf scorch

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A xylem-limited bacterium which causes disease in a wide range of plants, by blocking the transport of water and soluble mineral nutrients in the xylem. Common symptoms include leaf scorch, and withering and desiccation of terminal shoots. The bacterium is transmitted by a broad range of sap- and phloem feeding insect species.

HOST PLANTS: A wide range of broadleaf tree species are affected, including, notoriously, commercial olive trees (*Olea europaea*) and other fruit- and nut bearing species.

STATUS: Restricted distribution with France, Spain Portugal and Italy. It has a high potential to spread due to its wide host range and wide spectrum of insect vectors.

SIMILAR SPECIES: The symptoms of this disease are unspecific and may be confused with those caused by a large number of other plant pathogens, including the fungi which cause Anthracnose, *Verticillium* spp., and numerous abiotic factors such as water or nutrient deficiency, salt, air pollutants, sun scorch, and herbicides. Seeking expert help with diagnostics is needed to confirm the presence of the disease.

TAXONOMY:

Xanthomonadales, Xanthomonadaceae

NATIVE RANGE:

South America

PATHWAYS:

plant trade, secondary with insects

Insects

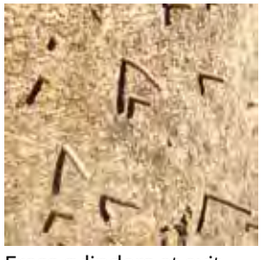
Authors: Maarten de Groot, Andreja Kavčič, Cristina Preda, Milka Glavendekić

Asian ambrosia beetle

ALERT

Xylosandrus crassiusculus (Motschulsky, 1866)

Larvae, pupae and beetles in a tunnel in wood



Frass cylinders at exit holes in bark

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: An oval-shaped, 1.5–3 mm long reddish-brown beetle with a compact, slightly dorsally curved body. Elytral declivity convex. Larva is a limbless, whitish maggot, about 3 mm long with a dorsally curved body (in the shape of letter "C"). Females excavate into the wood of host trees through circular entry holes of cca. 2 mm in diameter. When boring tunnels in the wood, they push out frass, which appears on the bark as toothpick-like structures, up to 4 cm long. Damaged parts of trees die back. The beetles overwinter as adults.

HABITAT: This species is polyphagous on deciduous trees and inhabits a range of natural habitats, agricultural and urban areas, plantations, tree nurseries. Adults may be found on thinner branches and trunks (up to 30 cm diameter) of various deciduous trees.

STATUS: Found in southwestern Europe. Slowly spreading to neighbouring countries.

SIMILAR SPECIES: Several species of wood-boring beetles, in particular the black timber bark beetle (*X. germanus*) and the European shot-hole borer (*Anisandrus dispar*). These species are difficult to distinguish with certainty with the naked eye.

TAXONOMY:

Coleoptera, Curculionidae

NATIVE RANGE:

Southeast Asia

PATHWAYS:

international trade with wood and live plants, spontaneous spread

Asian longhorn beetle

PH A1

Anoplophora glabripennis (Motschulsky, 1853)

Larva within wood

Circular emergence holes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A shiny black beetle; 25–35 mm long and 7–12 mm wide. Elytra with ca. 20 small, irregularly shaped white spots and a smooth base. The antennae are 1.3–2.5-times longer than the body, with 11 black segments, each with an a whitish-blue base. The larva is an elongate (max. 50 mm long, 10 mm wide), cream coloured maggot which bores tunnels in wood, 10–30 mm in diameter. Adults exit through emergence holes ca. 10–15 mm in diameter, usually in the upper part of the trunk or at the bases of the branches. Damaged trees suffer dieback. They overwinter as larvae.

HABITAT: They are polyphagous on deciduous trees and occur in a range of natural habitats, agricultural and urban areas, plantations and tree nurseries. Larvae live in wood while adult beetles can be found in the canopy, on the bark of the trunk and branches.

STATUS: Found in urban sites in several European countries. Eradication measures are underway.

SIMILAR SPECIES: The citrus longhorn beetle (*Anoplophora chinensis*) is very similar but has numerous small protuberances (granulae) on the base of the elytra (see p. 167). The larvae are similar to larvae of other cerambycids.

TAXONOMY:

Coleoptera, Cerambycidae

NATIVE RANGE:

East Asia

PATHWAYS:

trade in live plants and wood, spontaneous spread

Citrus longhorn beetle

PH A2

Anoplophora chinensis (Forster, 1771)

Larva in the wood

A circular emergence hole

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Adults are shiny black beetles, 25–40 mm long, whose elytra have numerous small, irregular white spots with many small protuberances on the bases of the elytra. The antennae are 1.2x to double their body length, with 11 segments, each with a whitish-blue base. The larva is a maggot, 50–60 mm long, 10 mm in diameter, creamy white in colour and boring tunnels in wood, 10–30 mm across. Adults exit through emergence holes of cca. 10–20 mm diameter. The damaged trees suffer dieback. They overwinter as larvae.

HABITAT: They are polyphagous on deciduous trees and occur in a range of natural habitats, agricultural and urban areas, plantations and tree nurseries. Larvae live in wood while adult beetles can be found in the canopy, on the bark of the trunk and branches.

STATUS: Found in urban sites in several European countries. Eradication measures are underway.

SIMILAR SPECIES: Very similar is the Asian longhorn beetle (*Anoplophora glabripennis*), which has smooth elytron bases while the larvae are similar to larvae of other cerambycids.

TAXONOMY:

Coleoptera, Cerambycidae

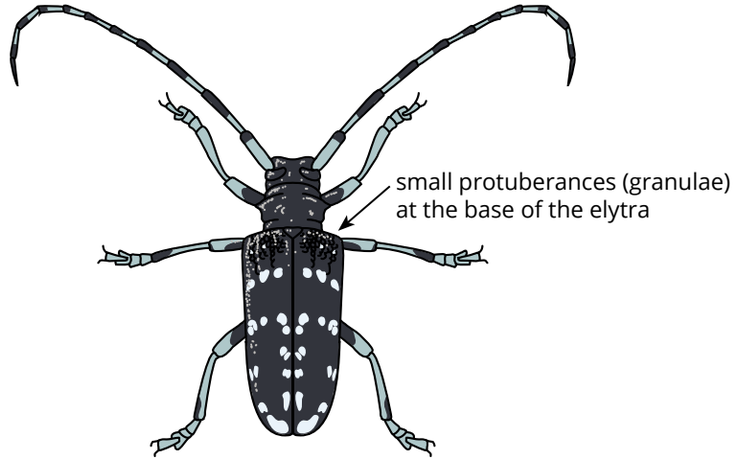
NATIVE RANGE:

East Asia

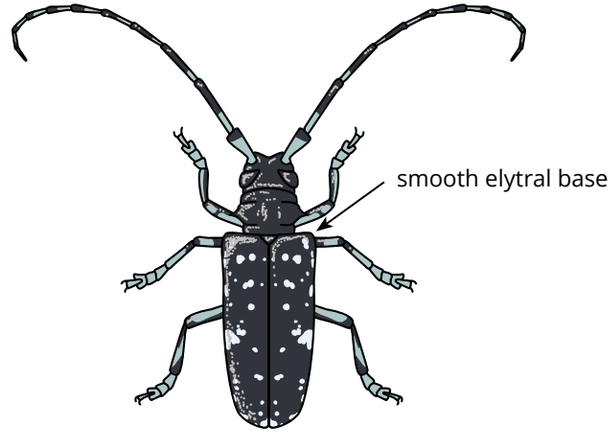
PATHWAYS:

trade in live plants and wood, spontaneous spread

Citrus longhorn beetle (*Anoplophora chinensis*) AS



Asian longhorn beetle (*Anoplophora glabripennis*) AS



Red-necked longicorn

Aromia bungii (Faldermann, 1835)

PH A1

Larva within wood

Oval emergence holes

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Adults are shiny black beetles with a red pronotum, 20–40 mm long. On each side of pronotum there is a stout lateral spine. The antennae are as long as the body or longer. The larvae are elongate, 42–52 mm long and 10 mm in diameter, creamy white with three pairs of legs and feed on wood, in which they create oval boring tunnels with a diameter of 13 x 17-22 mm. Adults exit through oval emergence holes in the bark, which are 6–10 mm wide and 10–16 mm high. Damaged trees suffer dieback. They species overwinters as a larva in wood.

HABITAT: They are oligophagous on trees of the genus *Prunus* in variety of natural habitats, agricultural and urban areas, plantations and tree nurseries. The larvae live in wood, and the adults in the canopy of trees, on bark of tree trunks and on branches.

STATUS: Found in several locations in Germany and Italy.

SIMILAR SPECIES: Musk beetle (*Aromia moschata ambrosiaca*) is similar in size and also has a red pronotum, but it has a metallic green body. It lives only on willows (*Salix* spp.). The larvae are similar to larvae of other cerambycid beetles.

TAXONOMY:

Coleoptera, Cerambycidae

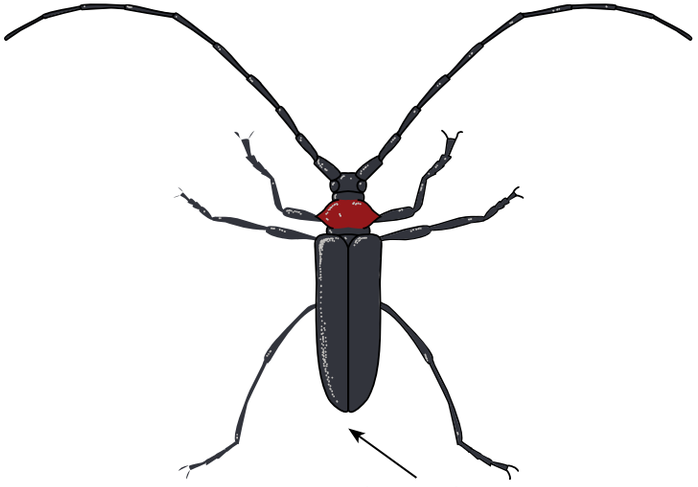
NATIVE RANGE:

East Asia

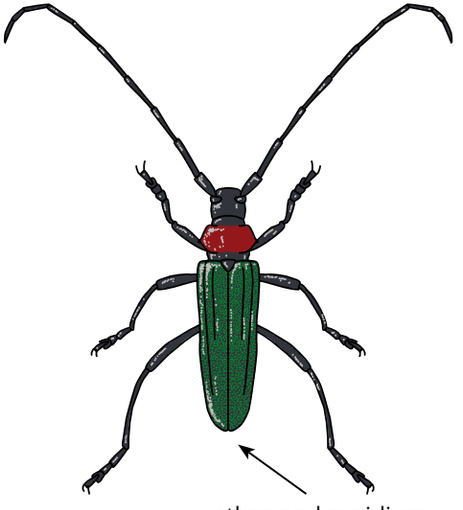
PATHWAYS:

trade in live plants and wood, spontaneous spread

Red-necked longicorn (*Aromia bungii*) AS



Musk beetle (*Aromia moschata ambrosiaca*) ES



Japanese cedar longhorn beetle

Callidiellum rufipenne Motschulsky, 1860

Larva within wood

Boring galleries underneath bark

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Males are backish-blue beetles, 6-13 mm long, with brownish head and a reddish patch on the "shoulders" of the elytra. The antennae extend beyond the posterior end of the abdomen. The elytra and abdomen of the females are reddish brown and their antennae are up to three-quarters the length of the body. The antennae are black and the second antennomere is elongated. The legs are black, and the femora are elongated and thickened. The eggs are white and 1.4 mm long while the larvae may be more than 20 mm long.

HABITAT: Coniferous woodland, gardens, parks and nurseries.

STATUS: Established in Italy and Spain. There is a risk of introduction with wood packaging materials and nursery stock. Risk of further spread.

SIMILAR SPECIES: The European native black-striped longhorn beetle (*Stenurella melanura*) has the antennae about the same length as the body. Males are black with yellowish-brown elytra with a black coloured tip, while the elytra are reddish in females.

TAXONOMY:

Coleoptera, Cerambycidae

NATIVE RANGE:

East Asia

PATHWAYS:

trade with solid wood packaging and nursery stock

Two-lined chestnut borer

ALERT

Agrilus bilineatus (Weber 1801)

Larva

Galleries under the bark

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Adults of this buprestrid beetle species are 5–13 mm long, metallic blue in colour, with two narrow pale lines running along their back. Their life cycle takes one to two years. The larvae are whitish to brown with two spines on the end of the abdomen and measure 18–24 mm in the last larval stage. Larvae construct galleries underneath tree bark which start out narrow and become broader in the later larval stages. Exit holes are 5 mm in diameter and have the shape of letter "D".

HABITAT: Host trees include chestnuts (*Castanea* spp.) and oak species (*Quercus* spp.). The beetles can be found both in forests and in urban habitats.

STATUS: Found in Turkey.

SIMILAR SPECIES: Other buprestid beetle species are similar in overall shape, but lack the two lines along their back. On the same host plant species, we may find larvae of similar buprestid beetles, for instance of the native oak splendour beetle (*Agrilus biguttatus*).

TAXONOMY:

Coleoptera, Buprestidae

NATIVE RANGE:

North America

PATHWAYS:

trade with saplings and wood of host plants

Emerald ash borer

Agrilus planipennis (Fairmaire, 1888)

PH A2

Exit holes

Galleries under the bark

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: The Emerald ash borer is a shiny, emerald green buprestid beetle, 8–14 mm long. The larvae are creamy yellow and up to 26-32 mm long. The pronotum is broader than the rest of the body. The larvae construct zigzag-shaped galleries beneath tree bark, 20–30 mm long. The creamy white pupa may be found deeper, in the cambium layer. The characteristic "D"-shaped exit holes have a diameter of 3–4 mm.

HABITAT: Host plants are ash species (*Fraxinus* spp.). This species can be found both in forests and in urban settings.

STATUS: Found in the surroundings of Moscow (Russia) and currently spreading westwards.

SIMILAR SPECIES: The emerald ash borer is very similar to native European species of the genus *Agrilus*, especially the oak splendour beetle (*A. biguttatus*) and the metallic wood-boring beetle (*A. ater*). Similar deaths of ash trees are also caused by the fungus ash dieback (*Hymenoscyphus fraxineus*) and by various "honey fungi" (*Armillaria* spp).

TAXONOMY:

Coleoptera, Buprestidae

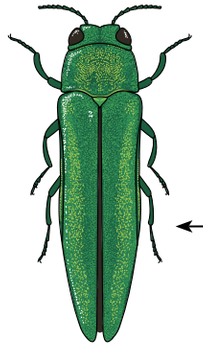
NATIVE RANGE:

East Asia

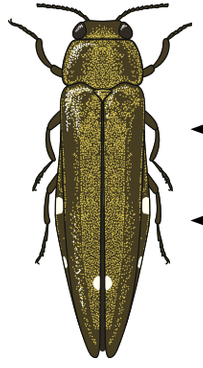
PATHWAYS:

trade with saplings and wood packaging material

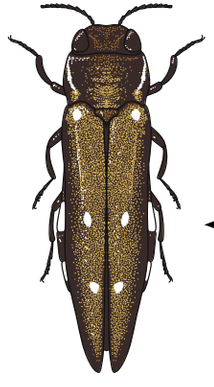
Emerald ash borer (*Agrilus planipennis*) AS



Oak splendour beetle (*Agrilus biguttatus*) ES



Metallic wood-boring beetle (*Agrilus ater*) ES



Japanese beetle

Popillia japonica Newman, 1841

PH A2

Larva

Skeletonized leaf

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A robust beetle, 8–12 mm long. The thorax is metallic green, while the elytra are coppery -red and somewhat shorter than the abdomen. The edge of the abdomen is adorned with 6 pairs of white hairy tufts. The spherical to slightly cylindrical eggs are translucent to creamy white. The larva (a grub) is creamy white with a yellowish-brown head, three pairs of legs and a thickened hind part. At rest, it lies in a C-shape. Adult beetles feed on plant leaves while the larvae live underground and eat plant roots and this damage may cause plants to die. It overwinters underground in the larval stage.

HABITAT: Polyphagous on a wide variety of deciduous trees, shrubs and herbaceous plants. They occur in natural habitats as well as agricultural and urban environments.

STATUS: Only found in a few European countries so far, but rapidly spreading to neighbouring countries.

SIMILAR SPECIES: The native garden chafer (*Phyllopertha horticola*) lacks hairy white tufts at the end of its abdomen.

TAXONOMY:

Coleoptera, Scarabaeidae

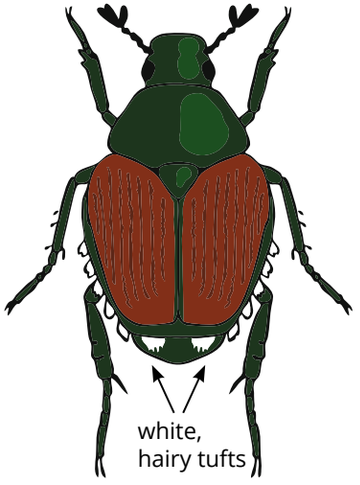
NATIVE RANGE:

East Asia

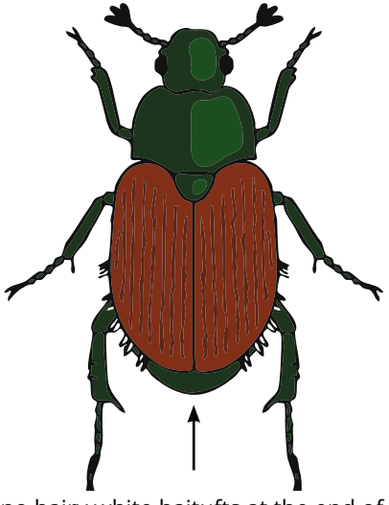
PATHWAYS:

stowaway, spontaneous spread

Japanese beetle (*Popillia japonica*) AS



Garden chafer (*Phyllopertha horticola*) ES



no hairy white haitufts at the end of the abdomen; hairs at the sides of the abdomen are not in dense tufts

Western conifer seed bug

Leptoglossus occidentalis Heidemann, 1910

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: An elongated, reddish-brown bug, 15–20 mm long. The edge of abdomen is flat with white and brown bands. The antennae consist of four elongated segments. The hind part of tibiae are broadly flattened and leaf-like, in both adults and larvae (nymphs). Nymphs are small and reddish, with long legs. The bug is polyphagous on conifers, where both adults and nymphs feed from flowers and seeds, which may compromise rejuvenation of coniferous trees because of the damage.

HABITAT: A variety of natural habitats, farmland and urban environments, as well as tree plantations. Individuals may be found on thin branches and cones of coniferous trees. Hibernation takes place in cracks in bark, in a variety of natural cavities and frequently also in buildings.

STATUS: Widespread through Europe.

SIMILAR SPECIES: Similar include the box bug (*Gonocerus acuteangulatus*), *Ceraleptus gracilicornis* and other European bug species although none of these have the broadened leaf-like tibia on their hind legs.

TAXONOMY:

Hemiptera, Coreidae

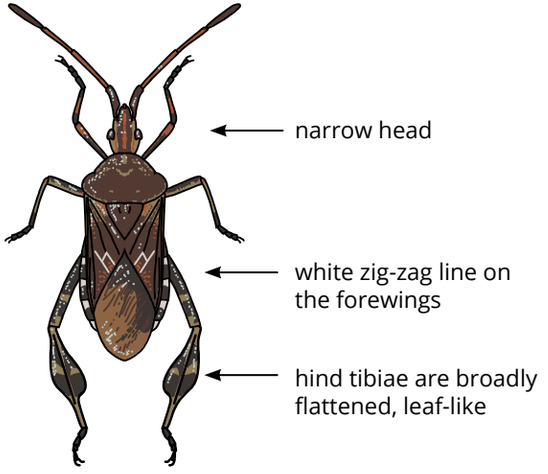
NATIVE RANGE:

North America

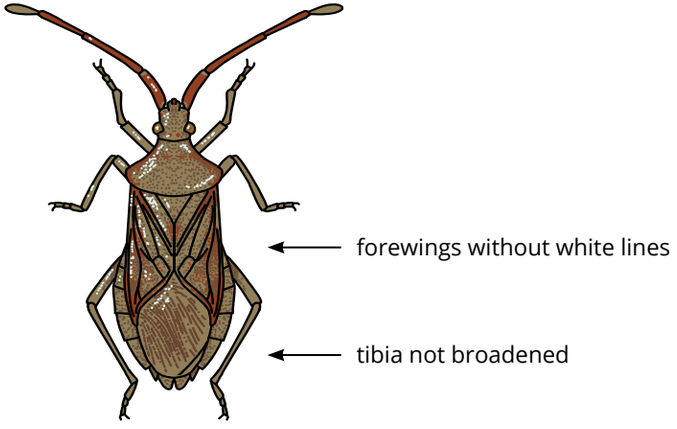
PATHWAYS:

international trade with plants, spontaneous spread

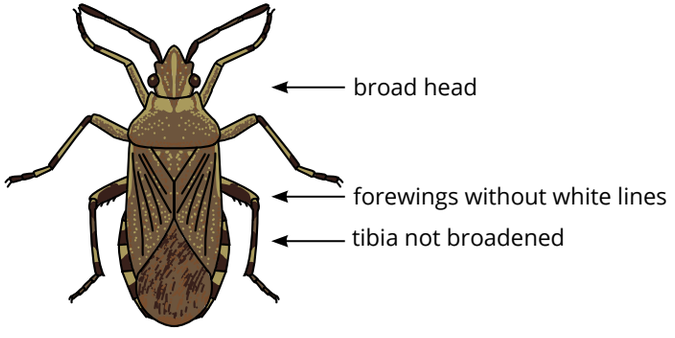
Western conifer seed bug (*Leptoglossus occidentalis*) AS



Box bug (*Gonocerus acuteangulatus*) ES



Ceraleptus gracilicornis ES



Brown marmorated stink bug

Halyomorpha halys Stål, 1855

Eggs

Nymphs

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A greyish-brown bug, 12–17 mm long. The body is shield-shaped, the antennae dark with light bands. On the edge of the abdomen there are alternating dark and light triangular patches. Inside the dark patches, is a yellowish spot. There are also a few pale yellow spots on the front edges of pronotum and scutellum. The membranous part of the forewing has dark stripes. Females lay white eggs in a single-layered cluster (egg mass). It feeds on various plant parts, which causes them to decay and dry.

HABITAT: Found on a wide variety of trees, bushes and herbs in both agricultural and urban environments and in natural habitats. Adult bugs often hibernate in houses.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: Mottled stink bug (*Rhaphigaster nebulosa*) lacks the light spots on the pronotum and scutellum while the light patches on the edge of the abdomen are square. It also lacks the light spots in the dark patches on the abdomen. The brownish forms of the southern green stink bug (*Nezara viridula*) have a similar colour in autumn and early spring, but its pygidium ("tail") is uniform brown without dark stripes or spots.

TAXONOMY

Hemiptera,
Pentatomidae

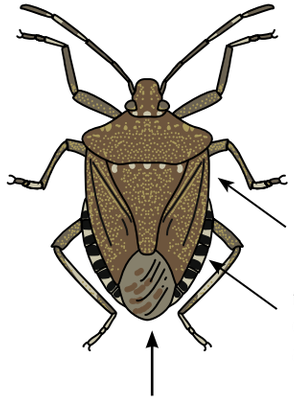
NATIVE RANGE:

East Asia

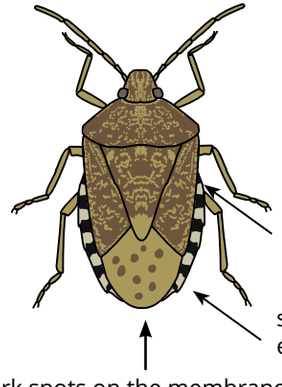
PATHWAYS:

stowaway,
spontaneous spread

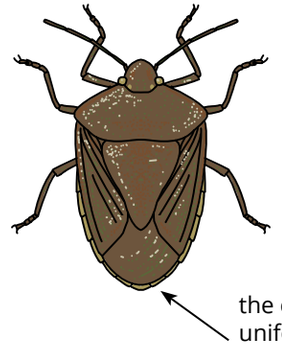
Brown marmorated stink bug (*Halyomorpha halys*) AS



Mottled stink bug (*Rhaphigaster nebulosa*) ES



Southern green stink bug (*Nezara viridula*) ES



Citrus flatid planthopper

Metcalfa pruinosa (Say, 1830)

Larva

Larvae and waxy filaments on host plant

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Adults measure 5.5–8 mm in length. The colour varies from brown to grey, depending on the amount of waxy powder on the body. Two dark spots are visible on the basal half of the front wings. Individuals display on the stems of host plants . Nymphs are covered with waxy filaments. This planthopper overwinters as an egg beneath the bark.

HABITAT: Woodland, urban and agricultural areas. The species is polyphagous, feeding on a wide range of trees, shrubs and herbs (e.g. *Fraxinus excelsior*, *Acer* spp., *Clematis vitalba*, *Cotinus coggygria*, *Crataegus monogyna etc.*).

STATUS: Occurring across Europe except for the northernmost parts. Most often found in areas with an average annual precipitation of between 600 and 1625 mm.

SIMILAR SPECIES: Woolly aphids (Hemiptera: Eriosomatinae) produce similar white waxy filaments for protection on their host plants. However, the nymphs of citrus flatid planthoppers are quite flat, their length being less than twice their width (about 4 mm long when fully grown) and are generally stouter than woolly aphids. The adults are easily distinguished from these aphids.

TAXONOMY:

Hemiptera, Flatidae

NATIVE RANGE:

eastern North America

PATHWAYS:

contaminant, intentional release, spontaneous spread

Silver fir woolly adelgid

Dreyfusia nordmannianae (Eckstein, 1890)

Curled needles

Infestation

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: Winged females on the primary host tree *Picea orientalis*, are 1.1–2.3 mm long with a wingspan of 4.6 mm. Directly after the final moult they are greenish, later turning darker. Winged females from the secondary host (*Abies* spp.) are grey-green and 0.8– 1.2 mm long. Parthenogenetic females are blackish-brown to blackish-violet and 0.7–1.5 mm long. They have waxy edges on their flanks and a waxy comb on the middle of their back. Newly-hatched larvae measure about 0.4 mm. The eggs are russet brown.

HABITAT: Coniferous woodland, cultivated areas of gardens and parks and Christmas tree plantations in forests and fields.

STATUS: Common in plantations of *Abies nordmanniana* and on other fir species (*Abies* spp.).

SIMILAR SPECIES: It belongs to a group of similar species: *Dreyfusia piceae*, *D. merkeri, D. prelli, D. nebrodensis* and *D. schneideri* in Europe and Western Asia. Infested fir needles curl back and become deformed, whereas the Balsam twig aphid (*Mindarus abietis*) causes needles to curl upwards.

TAXONOMY:

Hemiptera, Adelgidae

NATIVE RANGE:

Caucasus, NE Turkey and Crimea

PATHWAYS:

plantations and trade of exotic ornamental trees

Sycamore lace bug

Corythucha ciliata (Say, 1832)

Larvae (nymphs)

Adult lace bug

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A square-shaped lace bug, 3 mm long and 2 mm wide. The body is dorsoventrally flattened and the elytra are white, translucent with a lace-like texture, with a brown protuberance in the middle of each elytron. The nymphs are blackish and covered with spines. Damaged leaves develop pale patches and in severe infestations these dry out and are shed prematurely. It overwinters as an adult in cracks of the bark and similar protected spaces.

HABITAT: In spite of its name, the Sycamore lace bug does not normally occur on sycamore trees (*Acer* spp.), but on plane trees (*Platanus* spp.). They live on the underside of leaves where they suck the sap of plant cells. As, in Europe, plane trees are mostly planted as ornamentals, Sycamore lace bugs are found in urban areas, especially on street trees and in parks and gardens.

STATUS: Widespread throughout Europe.

SIMILAR SPECIES: The oak lace bug (*Corythucha arcuata*) is very similar and the species cannot be reliably distinguished with the naked eye. However, the sycamore lace bug is only found on plane trees while the oak lace bug occurs on oaks.

TAXONOMY:

Heteroptera, Tingidae

NATIVE RANGE:

North America

PATHWAYS:

trade in nursery stock, spontaneous spread

Oak lace bug

Corythucha arcuata (Say, 1832)

Eggs and larvae

Adult lace bug

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A square-shaped, creamy-white lace bug, 3 mm long and 1 mm wide. The body is dorsoventrally flattened. The elytra are transparent with a lace-like texture and several brown or black spots. The nymphs are blackish and covered with numerous small spines. They live on the underside of oak leaves, where they suck the sap of plant cells. Damaged leaves develop pale patches and in severe infestations these dry out and are shed prematurely. As a result of this damage, young trees in particular may become weakened and their growth slows and in some cases this may impede forest rejuvenation. Oak lace bugs overwinter as adults in cracks in the bark.

HABITAT: On oaks (*Quercus* spp.) in natural habitats, tree nurseries, plantations and in urban areas.

STATUS: Mainly in southern Europe, spreading quickly northwards and westwards.

SIMILAR SPECIES: : The sycamore lace bug (*Corythucha ciliata*) is very similar and these species cannot be reliably distinguished with the naked eye. However, the oak lace bug is found on oaks and the sycamore lace bug on plane trees.

TAXONOMY:

Heteroptera, Tingidae

NATIVE RANGE:

North America

PATHWAYS:

trade in nursery stock, spontaneous spread

Oriental chestnut gall wasp

A2

Dryocosmus kuriphilus Yasumatsu, 1951

Adult gall wasp

Cut gall with a wasp inside

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A black gall wasp, up to 3 mm long, with orange legs. Only parthenogenetic females are known in this species. In early summer, these lay eggs on buds, and the larvae that hatch start feeding on the plant tissue. The following spring (March–April) the larvae resume their activity and provoke the formation of galls on the newly growing leaves. These galls are ovate, 5–20 mm long, green or sometimes slightly reddish. Between May and July, adult wasps emerge from the galls, through circular exit holes. Because of the galls, the growth of twigs, development of flowers and the fruiting of the host trees are impaired.

HABITAT: Host plants are various species of chestnuts (*Castanea* spp.). The wasp can be found in forests and other natural habitats, in tree nurseries, plantations and in urban areas.

STATUS: Widespread in several European countries, and spreading rapidly.

SIMILAR SPECIES: Various other species of gall wasps are very similar, but none of them occur on chestnuts.

TAXONOMY:

Hymenoptera, Cynipidae

NATIVE RANGE:

East Asia (China)

PATHWAYS:

plants for planting and grafting, spontaneous spread

Zigzag elm sawfly

Aproceros leucopoda Takeuchi, 1939

Larva

Adult sawfly

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: : A wasp with a black body and white legs, 6 mm long. The larvae are caterpillar-like, 10 mm long, with 2 to 3 pairs of thoracic legs and 8 pairs of prolegs on the abdomen. On the 2nd and 3rd pair of thoracic legs they have characteristic dark brown T-shaped marks. The larvae feed on elm leaves, causing characteristic zigzag-shaped damage and extensive infestations may defoliate entire trees. The species overwinters as a pupa in leaf litter.

HABITAT: On the leaves of elms (*Ulmus* spp.) in forests, rural areas and in urban green areas.

STATUS: Widespread throughout most of Europe, but in low numbers.

SIMILAR SPECIES: Several small, black sawfly species of the genera *Pseudaprosthema, Pseudarge, Kokujewia and Aprosthema* are very similar and cannot be distinguished with the naked eye, differing in wing-patterns, host plants and the pattern of damage they inflict on the host's leaves.

TAXONOMY:

Hymenoptera, Argidae

NATIVE RANGE:

East Asia

PATHWAYS:

stowaway, spontaneous spread

Asian hornet

Vespa velutina Lepeletier, 1836

Nest

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A large wasp, 20–30 mm long. The head is black with a yellow frons, a black thorax and a dark brown abdomen. Every abdominal segment has a narrow yellow trailing edge, with the exception of the fourth abdominal segment, which is entirely yellow-brown to orange. The upper legs are brown with yellow distal parts. In springtime, the females build cellulose nests, in which the queen lays her eggs. Asian hornet nests are large, egg-shaped structures which can measure 0.5 m or more in diameter. The nest entrance-hole is placed in the side of the nest. Only queens overwinter.

HABITAT: A range of natural habitats, farmland and urban areas. Nests are built in tall trees and on a variety of high objects.

STATUS: Present in several European countries.

SIMILAR SPECIES: The European hornet (*Vespa crabro*) is very similar, but is somewhat larger and has a yellow abdomen. The nest of European hornet has the entrance-hole on the underside rather than laterally.

TAXONOMY:

Hymenoptera,
Vespidae

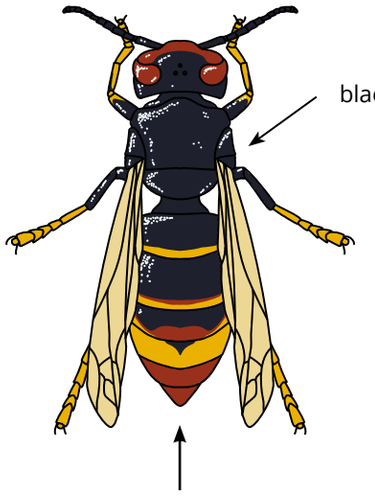
NATIVE RANGE:

Asia

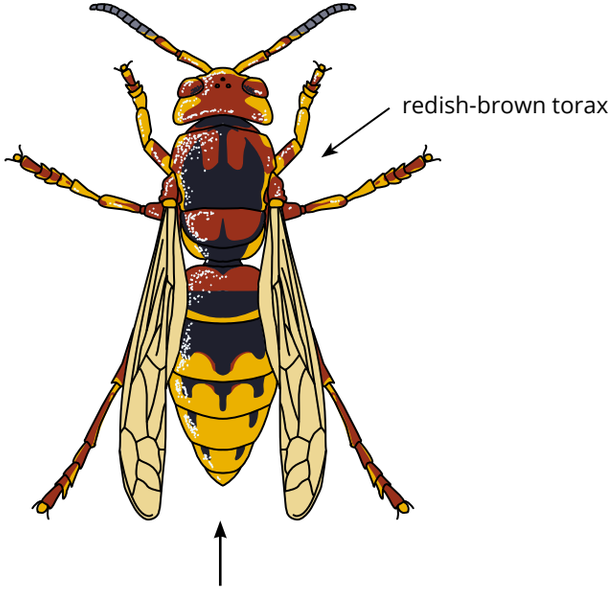
PATHWAYS:

stowaway,
spotnaneous spread

Asian hornet (*Vespa velutina*) AS



European hornet (*Vespa crabro*) ES



Horse-chestnut leaf miner

Cameraria ohridella Deschka & Dimic, 1986

Caterpillar

Adult moth

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small moth with an overall length of 3–5 mm and a wingspan of 7–8 mm. The wings are brown with transverse white and black stripes and fringed edges. Females lay their eggs along the lateral leaf veins on the uppersides of Horse-chestnut (*Aesculus hippocastanum*) leaves. The first instar caterpillar enters the middle layer of the leaf where it feeds on the tissue between the upper and lower epidermis. In this way, a mine is created between two neighbouring veins. Fully grown caterpillars measure up to 5 mm long. Initial leaf damage becomes visible in May and damaged leaves dry and are shed prematurely. Horse-chestnut leaf-miners overwinter as pupae on fallen leaves.

HABITAT: Urban areas: avenues of street trees, parks and gardens where horse-chestnuts are planted.

STATUS: Widespread and common throughout Europe.

SIMILAR SPECIES: There are several similar species in the family of leaf blotch miner moths (Gracillariidae), which, however, exploit different larval host plants. The fungus *Guignardia aesculi* causes similar-looking damage on horse-chestnut trees.

TAXONOMY:

Lepidoptera, Gracillariidae

NATIVE RANGE:

Balkan

PATHWAYS:

stowaway, spontaneous spread

Lime leaf miner

Phyllonorycter issikii (Kumata, 1963)

Leaf damage

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small moth with a wingspan of 6–8 mm. Adults overwinter in bark crevices on lime trees and become active in spring. After mating, females lay their eggs on the underside of leaves. The first instar larva burrows into the mesophyll and begins forming a mine which expands gradually; the last instar pupating within the mine itself. A seasonal dimorphism can be noted in the adults: the summer form is largely ochreous while the winter form is darker.

HABITAT: Deciduous forest stands, urban areas. Host plants are lime trees (*Tilia* spp.).

STATUS: Recorded from most of Europe but may spread further westwards, depending on the availability of the host plants and climatic suitability.

SIMILAR SPECIES: Adults resemble other moths in the family Gracillariidae. The European oak leaf miner (*Phyllonorycter messaniella*) may use lime trees as a host and forms small, oval mines on the underside of leaves. Inside the mine, the pupa is generally surrounded by frass. The adults have a white frons, characteristic erect hairs on the head and a distinctive pattern on the forewings.

TAXONOMY:

Lepidoptera, Gracillariidae

NATIVE RANGE:

East Asia

PATHWAYS:

stowaway, contaminant spontaneous spread

Japanese oak silk moth

Antheraea yamamai Guérin-Meneville, 1861

Caterpillar

Cocoon with pupa

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A large moth with a wingspan of 11–15 cm. The wing colour is variable: sandy yellow to chocolate and reddish-brown. In the middle of each wing there is an eye-shaped spot, while distally of these there is a black, white and pink line. Caterpillars are bright green and measure up to 9 cm. Young caterpillars have five longitudinal black stripes. They hibernate as eggs, which females lay on branches of the host trees.

HABITAT: Lowland deciduous forests and parks. Caterpillars feed mainly on oaks (*Quercus* spp.), sometimes also on chestnuts (*Castanea* spp.), hornbeams (*Carpinus* spp.) and roses (*Rosa* spp.).

STATUS: Only in Central Europe, slowly spreading to surrounding countries.

SIMILAR SPECIES: The European giant peacock moth (*Saturnia pyri*) is equally large (wingspan 10–13 cm), but appears earlier (April–July) and has more extensively patterned wings. Its caterpillars bear excrescences with stinging hairs. Another similar European native species is the tau emperor (*Aglia tau*) which has an earlier flight season (March–July) and is smaller (wingspan 6–8.5 cm). Young caterpillars have distinctive pink tubercles.

TAXONOMY:

Lepidoptera, Saturniidae

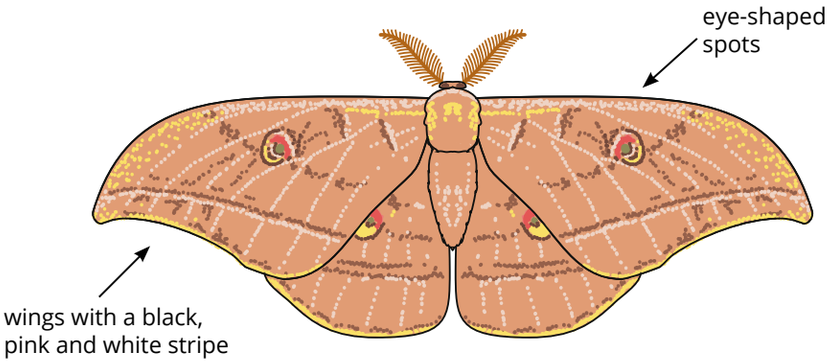
NATIVE RANGE:

East Asia (Japan)

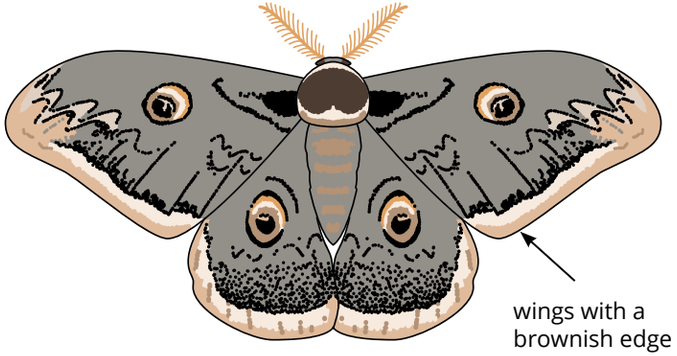
PATHWAYS:

intentional introduction, spontaneous spread

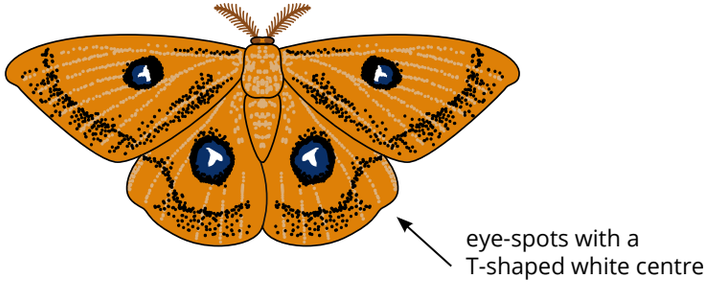
Japanese oak silk moth (*Antheraea yamamai*) AS



Giant peacock moth (*Saturnia pyri*) ES



Tau emperor (*Aglia tau*) ES



Box tree moth

Cydalima perspectalis (Walker, 1859)

Caterpillar

Damage on box tree

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A moth with a wingspan of 3–4 cm. The wings are off-white and slightly iridescent with a dark brown outer edge. On the front wings, there is a white spot. Females lay their eggs on the underside of the leaves of box trees (*Buxus* spp.). Young caterpillars are green, becoming browner later. Along their body, they have black and white stripes, and warty excrescences. They are hairy and measure up to 4 cm, feeding on box tree leaves. Often present in large numbers, they produce white spiderweb-like silk threads and box trees may die because of the damage. The moths overwinter as early instar larvae among the leaves.

HABITAT: Box tree moths occur on various box tree species (*Buxus* spp.) and can be found in natural habitats as well as urban settings and plant nurseries.

STATUS: Spreading rapidly throughout whole of Europe. Common.

SIMILAR SPECIES: In Europe, there are no similar moth species. The drying of box tree foliage may also be caused by the fungi *Cylindrocladium buxicola* and *Volutella buxi,* but in case of a fungal disease there are no spiderweb-like silk threads.

TAXONOMY:

Lepidoptera, Pyralidae

NATIVE RANGE:

East Asia

PATHWAYS:

transport of nursery stock, spontaneous spread

Birds and mammals

Authors: Katarina Flajšman, Tim Adriaens, Elena Tricarico, Sandro Bertolino, Paul Veenvliet, Jana Kus Veenvliet

Red-billed leiothrix

Leiothrix lutea (Scopoli, 1786)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A colourful member of the laughingthrush family, greyish-brown with an olive-green crown, a large pale eye-patch, a bright orange breast and red bill with a black base. The upperparts are plain olive-grey. The grey wing coverts contrast with orange-yellow fringes of the primaries and orange fringes on the secondaries. The tail is forked and blackish-brown. The sexes are similar but separable when seen side-by-side with females less brightly coloured overall, having a less deeply-forked tail and a more extensive black base of the bill.

HABITAT: Natural woodlands with dense undergrowth, bamboo forests and cultivated areas including olive groves.

STATUS: Established populations in Portugal, France, Italy and Spain. Breeding has been confirmed in the United Kingdom.

SIMILAR SPECIES: Silver-eared mesia (*Leiothrix argentauris*) is bred in captivity and may occasionally escape. It has a black-capped head, combined with whitish ear-patches. The European robin (*Erithacus rubecula*) has a more extensive orange breast patch which surrounds its eyes, uniform olive-coloured wings and a dark brown bill.

TAXONOMY:

Passeriformes, Leiothricidae

NATIVE RANGE:

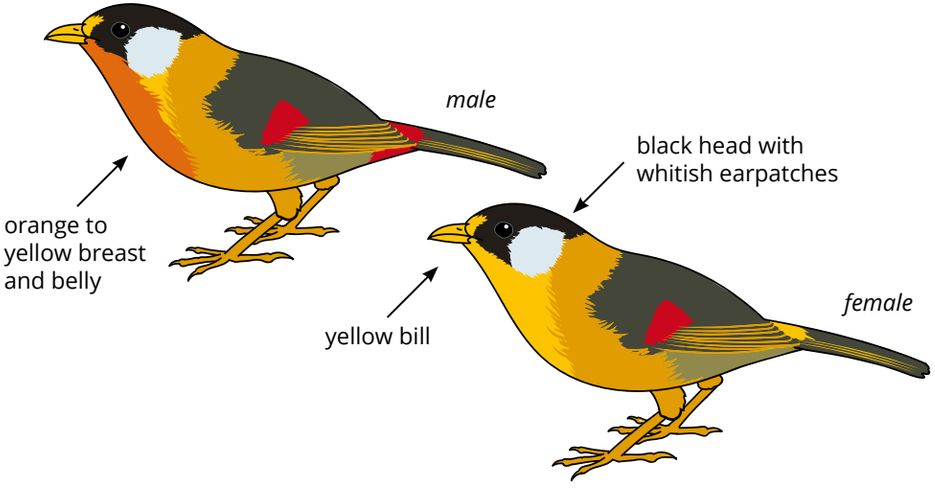
East Asia (China, Himalayas)

PATHWAYS:

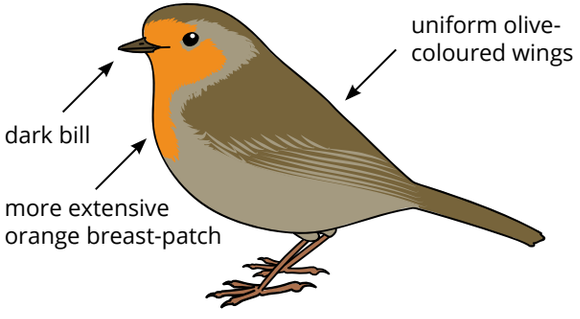
escape from captivity

Red-billed leiotrhrix (*Leiothrix lutea*) AS

Silver-eared mesia (*Leiothrix argentauris*) AS



European robin (*Erithacus rubecula*) ES



Vinous-throated parrotbill

Sinosuthora webbiana (Gould, 1852), syn. *Paradoxornis webbianus*

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small (12 cm) passerine with a long tail. The short, parrot-like bill is brown with a pale tip. The head and wings are rufous-brown while the back and tail are greyish. The throat is pale with fine rufous streaks. The iris is dark brown and legs are pinkish-grey. Sexes are similar. In Italy, it co-occurs and hybridises with the ashy-throated parrotbill subspecies (*P. w. alphonsiana*), which can be recognised by a more extensive pale bill, pale iris and grey cheeks.

HABITAT: Forest edges, thickets, hedgerows and reedbeds.

STATUS: Populations are established in Northern Italy and the Netherlands. Sensitive to cold winters.

SIMILAR SPECIES: European native bearded reedling (*Panurus biarmicus*) has black-streaked wings. The head of females and juveniles is pale brown while males have a grey head with characteristic black "moustaches".

TAXONOMY:

Passeriformes, Sylviidae

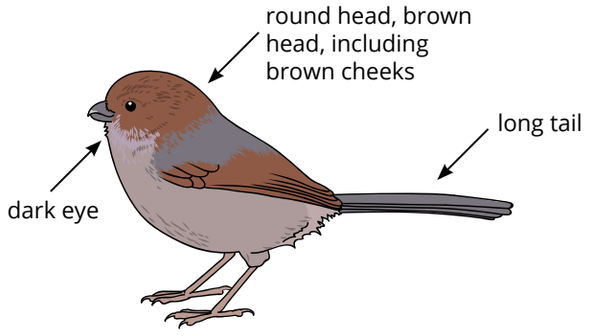
NATIVE RANGE:

East Asia
(China, Korea, Taiwan)

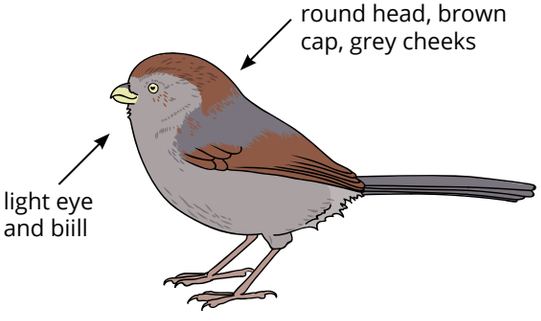
PATHWAYS:

releases from captivity

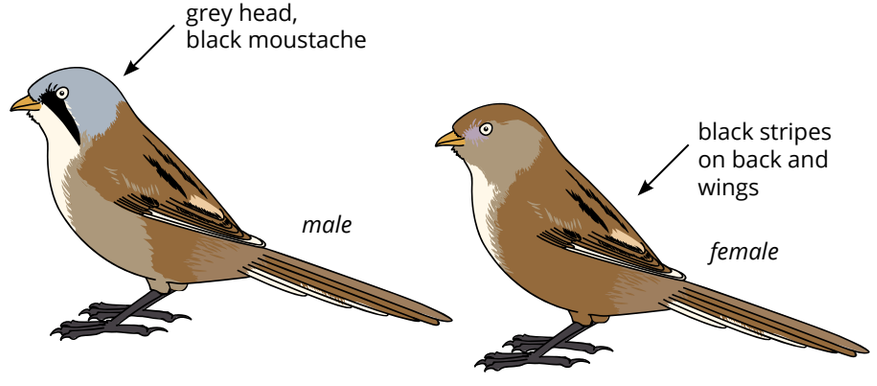
Vinous-throated parrotbill (*Sinosuthora webbiana webbiana*) AS



Ashy-throated parrotbill (*Sinosuthora webbiana alphonsiana*) AS



Bearded reedling (*Panurus biarmicus*) ES



Siberian chipmunk

Eutamias sibiricus (Laxmann, 1769) syn. *Tamias sibiricus*

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small ground squirrel (head-body length 12–17 cm, with a tail of 8–11 cm) with five dark, equally broad longitudinal stripes on its back and two dark stripes on each side of the head. The throat and belly are white but ear tufts are absent. When alarmed, it emits "chirping" sounds.

HABITAT: Coniferous and deciduous forests with a rich undergrowth as well as parks and gardens.

STATUS: Populations are locally established in at least seven countries. Native in parts of Russia (not shown on the map).

SIMILAR SPECIES: The eastern chipmunk (*Tamias striatus*) is larger (22–27 cm), has a grey rather than brown back and a narrower mid-dorsal stripe. The Himalayan striped squirrel (*Tamiops mcclellandii*) and Swinhoe's striped squirrel (*Tamiops swinhoei*) are smaller (max. 11 cm) and have distinct white ear tufts.

TAXONOMY:

Rodentia, Sciuridae

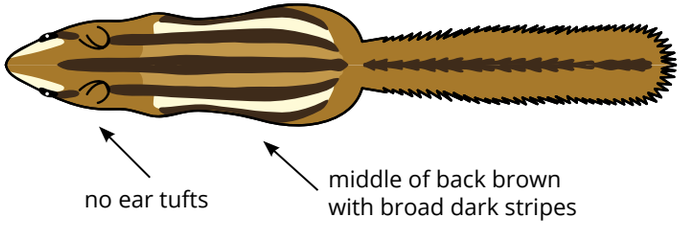
NATIVE RANGE:

northern and eastern Asia

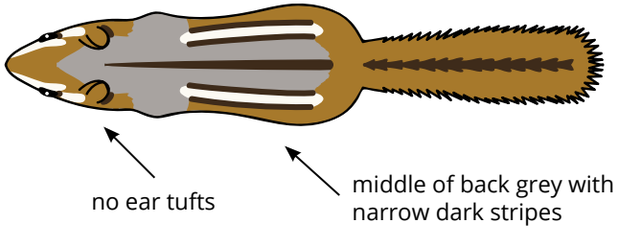
PATHWAYS:

escape or release from captivity

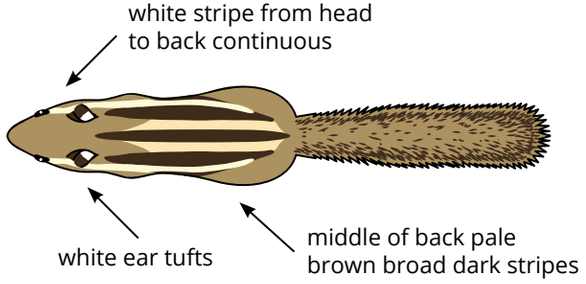
Siberian chipmunk (*Eutamias sibiricus*) AS



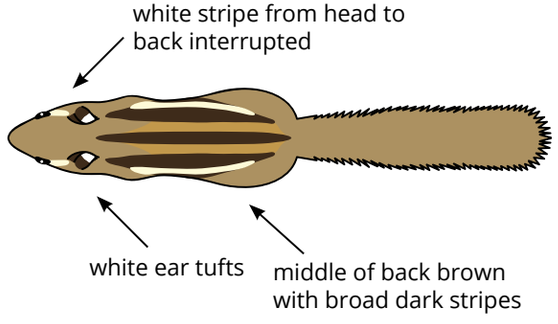
Eastern chipmunk (*Tamias striatus*) AS



Himalayan striped squirrel (*Tamiops mcclellandii*) AS



Swinhoe's striped squirrel (*Tamiops swinhoei*) AS



Grey squirrel

Sciurus carolinensis Gmelin 1788

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A large tree squirrel (head-body length 23–28 cm, with a tail of 20–24 cm), with a greyish colour combined with white underparts. The flanks, legs and head may be orangey-red. The tail is bicoloured: with the tail fur having a reddish base and whitish-grey tips. Ear tufts are not present in any season.

HABITAT: Mature deciduous and mixed forests with a high percentage of seed-producing trees. Often also in urban areas, especially city parks.

STATUS: Widespread in the UK and Ireland, established in Italy. Incidental escapes have been recorded in Belgium, the Netherlands, Germany and France.

SIMILAR SPECIES: The native Eurasian red squirrel (*Sciurus vulgaris*) is smaller (head-body length 21–25 cm with a tail of 15–20 cm) and has pronounced ear tufts which may be absent in summer. It is highly variable in colouration, but all morphs have a uniform coloured tail. The fox squirrel (*Sciurus niger*), rarely kept in captivity in Europe, is larger (head-body length 25–37 cm with a tail of 20–33 cm) and usually has yellow to orange underparts and lacks the whitish-grey tips on the tail fur.

TAXONOMY:

Rodentia, Sciuridae

NATIVE RANGE:

North America

PATHWAYS:

escape or release from captivity

American red squirrel

Tamiasciurus hudsonicus (Erxleben, 1777)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small tree squirrel (head-body length 18–23 cm, with a tail of 9–16 cm) with deep red coloured fur. It has pronounced white eye-rings, and a black lateral line which separates the red colour on the flanks from the white colouration of the underparts. This lateral line is especially visible in summer. In winter, it has small ear tufts.

HABITAT: Coniferous, mixed and deciduous forests, as well as parks and gardens.

STATUS: No established populations in Europe known, but occasional escapes have been recorded in the Netherlands and Belgium.

SIMILAR SPECIES: The native Eurasian red squirrel (*Sciurus vulgaris*) is slightly larger (21–25 cm long with a tail of 15–20 cm) and has long ear tufts which may be absent in summer. Its colour is highly variable, but it lacks a black lateral line in any of its colour morphs. The Calabrian squirrel (*S. meridionalis*) is nearly black with white underparts.

TAXONOMY:

Rodentia, Sciuridae

NATIVE RANGE:

North America

PATHWAYS:

escape or release from captivity

Pallas's squirrel

Callosciurus erythraeus (Pallas, 1779)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A medium-sized tree squirrel (head-body length 20–26 cm, with a tail of 17–20 cm) with an olive-brown coloured back and flanks and brown to chestnut or yellowish coloured underparts. The tips of the tail fur are white. No ear tufts are present in any season.

HABITAT: Forests, parks and gardens.

STATUS: Populations are eradicated in Belgium and the Netherlands. Populations present and undergoing eradication in France and Italy.

SIMILAR SPECIES: The native Eurasian red squirrel (*Sciurus vulgaris*) has white underparts and pronounced ear tufts, which may be absent in summer. Variable squirrel (*C. finlaysonii*), which is occasionally kept in captivity in Europe, has a highly variable colouration but has, in most colour morphs, has extensive white underparts.

TAXONOMY:

Rodentia, Sciuridae

NATIVE RANGE:

East and Southeast Asia

PATHWAYS:

escape or release from captivity

Ring-tailed coati

Nasua nasua (Linnaeus, 1766)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A cat-sized mammal (head-body length 40–65 cm, with a tail of 30-70 cm). The tail is slender with approximately 10 dark rings along its entire length. The front limbs are short, the hind limbs longer. Snout conical and black, grading to brown with white spots close to the eyes. The fur is usually light to dark brown.

HABITAT: Wooded areas, especially deciduous forests, evergreen forests and riparian forests.

STATUS: Established on Mallorca until at least 2015, but undergoing eradication. Single escaped individuals have been recorded in other European countries. Unlikely to survive in areas with severe winters.

SIMILAR SPECIES: Confusion is possible with raccoon (*Procyon lotor*) due to its ringed tail. The raccoon has a longer-furred tail, a less elongated snout and a black facial mask around its eyes. The white-nosed coati *(Nasua narica*) which is occasionally kept in captivity, is more similar but has a pronounced white facial pattern with a broad white band around its snout.

TAXONOMY:

Carnivora, Procyonidae

NATIVE RANGE:

South America

PATHWAYS:

escape or release from captivity

Raccoon

Procyon lotor Linnaeus, 1758

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A cat-sized mammal (head-body length 60–90 cm, with a tail of 20–40 cm) with a hunched body posture. The fur is usually grey, but reddish, beige and melanistic (black) forms are selectively bred. It is recognisable by its black facial mask combined with a thick tail with 4-10 black rings.

HABITAT: Highly adaptable to a range of habitats, but most often near water.

STATUS: Common and widespread in Germany, where has been established since the 1920's, but also established in neighbouring countries. Observations elsewhere in Europe are mainly sporadic.

SIMILAR SPECIES: The alien raccoon dog (*Nyctereutes procyonoides*) has a similar overall size and a black facial mask, but possesses a shorter tail without black rings. The Eurasian badger (*Meles meles*) has a more elongated, white head with black stripes running longitudinally instead of a transverse mask.

TAXONOMY:

Carnivora, Procyonidae

NATIVE RANGE:

North America

PATHWAYS:

escape or release from captivity

Raccoon dog

Nyctereutes procyonoides Gray, 1834

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small wild dog species (head-body length 50-70 cm, with a tail of 13-25 cm), which in overall appearance and size is similar to raccoon. Its fur is yellowish or reddish grey with darker black hairs from its back and shoulders along towards its tail, while the chest, neck, legs and feet are blackish. It has a facial mask similar to a raccoon, but its tail is uniformly coloured like the body.

HABITAT: It especially inhabits areas with a combination of meadows and deciduous or mixed forests with a well developed shrub layer, preferably close to water.

STATUS: A widespread and abundant species in Finland, Poland, Belarus, Latvia, Lithuania, Estonia, the Ukraine, Germany and Western Russia. Occasional individuals are recorded In other parts of Europe.

SIMILAR SPECIES: Raccoon (*Procyon lotor*) has a similar black facial mask and overall size, but possesses a black-ringed tail. It is somewhat similar to the Eurasian badger (*Meles meles*), which has a more elongated white head with black stripes running longitudinally instead of a transverse mask, and a light grey body.

TAXONOMY:

Carnivora, Canidae

NATIVE RANGE:

East Asia

PATHWAYS:

escaped or released from captivity

Reeves's muntjac

Muntiacus reevesi (Ogilby, 1839)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

DESCRIPTION: A small deer (50 cm at the shoulder) with a hunched posture (head carried low, bottom high, back arched). In summer it is reddish brown, in winter brownish-grey, with darker forelimbs and dark fascial markings. Males have small, backward-pointing antlers with 1 to 2 tines and enlarged canine tusks in the upper jaw. When alarmed, they lift their tail and show the white underside. The juveniles are white-spotted.

HABITAT: Deciduous, mixed and coniferous forest with dense undergrowth. It also occurs in orchards, parks, gardens, grassland and along road verges.

STATUS: Widespread in the UK, especially in England, less so in Wales. Small populations exist in Ireland, Belgium and the Netherlands. Also reported from France.

SIMILAR SPECIES: Roe deer (*Capreolus capreolus*) is larger (70 cm at the shoulder), lacks an obvious tail and has a white rump patch in winter. Males have upright antlers with 1 to 3 tines, but lack tusks. The Chinese water deer (*Hydropotus inermis*) is only slightly larger (55 cm at the shoulder) and has a short, stumpy tail and only an indistinct rump patch. It lacks dark facial markings. The males lack antlers but have prominent canine tusks.

TAXONOMY:

Artiodactyla, Cervidae

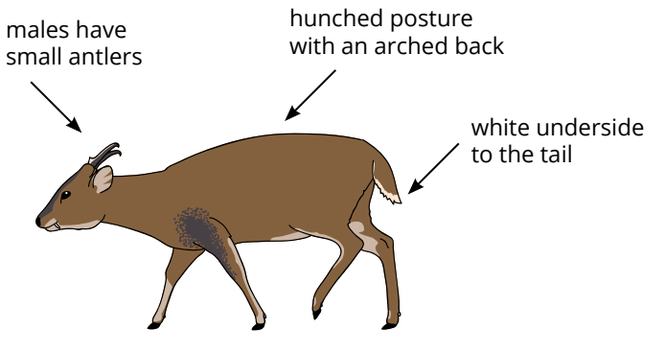
NATIVE RANGE:

East Asia (China, Taiwan)

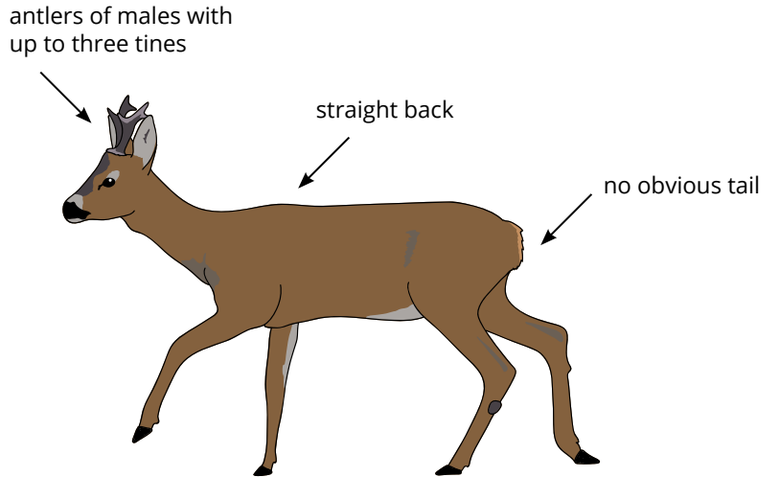
PATHWAYS:

escape from captivity, released for hunting

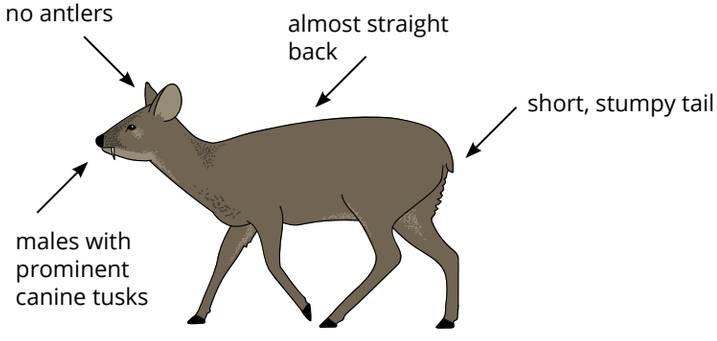
Reeves's muntjac (*Muntiacus reevesi*) AS



Roe deer (*Capreolus capreolus*) ES



Chinese water deer (*Hydropotus inermis*) AS



Index

Index

Authors of photographs

The authors of photographs are listed in the order as the species appear in the guide. The numbers mark the position of the photos as follows: ❶ the main photo at the species description, ❷ upper side photo, ❸ lower side photo, ❹ bottom photo of similar species (at some fungi). Where photos are also on the right pages, they are numbered from top to down.

BOOK COVER

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INTRODUCTION

Chapter title page: ***Lonicera japonica***, archive of Institute Symbiosis

Figure 1: a) ***Ailanthus altissima*** archive of Institute Symbiosis, b) ***Hymenoscyphus fraxineus*** archive of Institute Symbiosis, c) ***Anoplophora glabripennis*** exit holes Pennsylvania Department of Conservation and Natural Resources – Forestry, Bugwood.org, d) ***Sciurus carolinensis*** damage Rosser1954_CC BY-SA 4.0

TREES

Chapter title page: ***Ailanthus altissima***, archive of Institute Symbiosis

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Paulownia tomentosa ❶❷❸ archive of Institute Symbiosis

SHRUBS

Chapter title page: ***Berberis bealei***, archive of Institute Symbiosis

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Berberis aquifolium ❶❷ archive of Institute Symbiosis, ❸ Robert Vidéki (Doronicum Kft., Bugwood.org)

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Prunus laurocerasus ❶❷ archive of Institute Symbiosis

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Spiraea japonica ❶❷❸ archive of Institute Symbiosis

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Amorpha frutiocsa ❶❷❸ archive of Institute Symbiosis

Elaeagnus pungens ❶ archive of Institute Symbiosis, ❷❸ Andrea Moro (Universita di Trieste, Dryades Project)

Cornus sericea ❶❷❸ archive of Institute Symbiosis

Deutzia scarba ❶❷❸ archive of Institute Symbiosis

Lonicera maackii ❶ archive of Institute Symbiosis, ❷ Leslie J. Mehrhoff (University of Connecticut, Bugwood.org), ❸ Chuck Bargeron (University of Georgia, Bugwood.org)

Symphoriocarpos albus ❶❷❸ archive of Institute Symbiosis

Ligustrum lucidum ❶ John Ruter (University of Georgia, Bugwood, org), ❷ James H. Miller (USDA Forest Service, Bugwood.org), ❸ archive of Institute Symbiosis

Lycium barbarum ❶ Robert Vidéki (Doronicum Kft., Bugwood.org), ❷❸ archive of Institute Symbiosis

Buddleja davidii ❶❷❸ archive of Institute Symbiosis

Phylostachys **spp.** ❶❷❸ archive of Institute Symbiosis

CLIMBING PLANTS

Chapter title page: ***Akebia quinata***, archive of Institute Symbiosis

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Pueraria montana **var.** ***lobata*** ❶❷❸ archive of Institute Symbiosis

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Vitis vulpina ❶❷❸ John Hilty

Sicyos angulatus ❶ Ohio State Weed Lab (The Ohio State University, Bugwood.org), ❷ Daniele Camprini AdV L'Arca, Ravenna (Dryades Project)

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Arauija sericifera ❶❷❸ Andrea Moro (Universita di Trieste, project Dryades)

HERBACEOUS PLANTS

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Impatiens glandulifera ❶❷❸ archive of Institute Symbiosis
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Erigeron annuus ❶❷❸ archive of Institute Symbiosis
Cirsium candelabrum ❶❷❸ archive of Institute Symbiosis
Heracleum mantegazzianum ❶❷❸ archive of Institute Symbiosis

FUNGI AND BACTERIA

Chapter title page: ***Eutypella parasitica,*** Dušan Jurc
***Phytophthora* spp.** ❶❷ Nikica Ogris, ❸ Central Science Laboratory Archive, Bugwood.org
Heterobasidion irregulare ❶ Natural Resources Canada, ❷❸ Dušan Jurc
Cryphonectria parasitica ❶❷❸Dušan Jurc, ❹ Karmen Rodič (KGZ Novo mesto)
Biscogniauxia mediterranea ❶ Nikica Ogris, ❷ Dušan Jurc, ❸❹ Nikica Ogris
Geosmithia morbida ❶❷❸ Dušan Jurc
Cryptostroma corticale ❶❷ Malcolm Storey, ❸ Philipp Robeck
Eutypella parasitica ❶❷❸❹ Nikica Ogris, ❺ Dušan Jurc, ❻❼ Nikica Ogris, ❽ Amadej Trnkoczy, ❾ Nikica Ogris
Fusarium circinatum ❶❷❸ Nikica Ogris
Atropellis piniphila ❶ Natural Resources Canada, ❷ J. C. Hopkins, Bugwood.org, ❸ Natural Resources Canada, ❹ Dušan Jurc
Cronartium ribicola ❶❷ Dušan Jurc
Ophiostoma novo-ulmi ❶ Joseph Obrien (USDA Forest Service, Bugwood.org), ❷ Dušan Jurc,
Ceratocystis platani ❶❷❸❹Dušan Jurc,❺ William Jacobi (Colorado State University, Bugwood.org.)
Hymenoscyphus fraxineus ❶❷❸ Dušan Jurc, ❹❺Nikica Ogris
Neonectria neomacrospora ❶ Venche Talgø (Bioforsk)
Sirococcus tsugae ❶ Thomas Brand (Landwirtschaftskammer Niedersachsen (DE), EPPO gallery), ❷❸ Bruce Watt, University of Maine, Bugwood.org
Erysiphe platani ❶❷ Dušan Jurc
Dothistroma septosporum ❶❷❸ Dušan Jurc
Lecanosticta acicola ❶❷❸ Dušan Jurc
Melampsoridium hiratsukanum ❶❷ David Fenwick (APHOTOFUNGI), ❸ Andrej Kunca (National Forest Centre Slovakia, Bugwood.org)
Thekopsora minima ❶ Caleb Slemmons (National Ecological Observatory Network, Bugwood.org), ❷ ❸ Wolfgang Maier (Julius Kühn-Institut, EPPO gallery)
Xylella fastidiosa ❶ Jason Sharman, Vitalitree, Bugwood.org, ❷ Brian Olson, Oklahoma State University, Bugwood.org

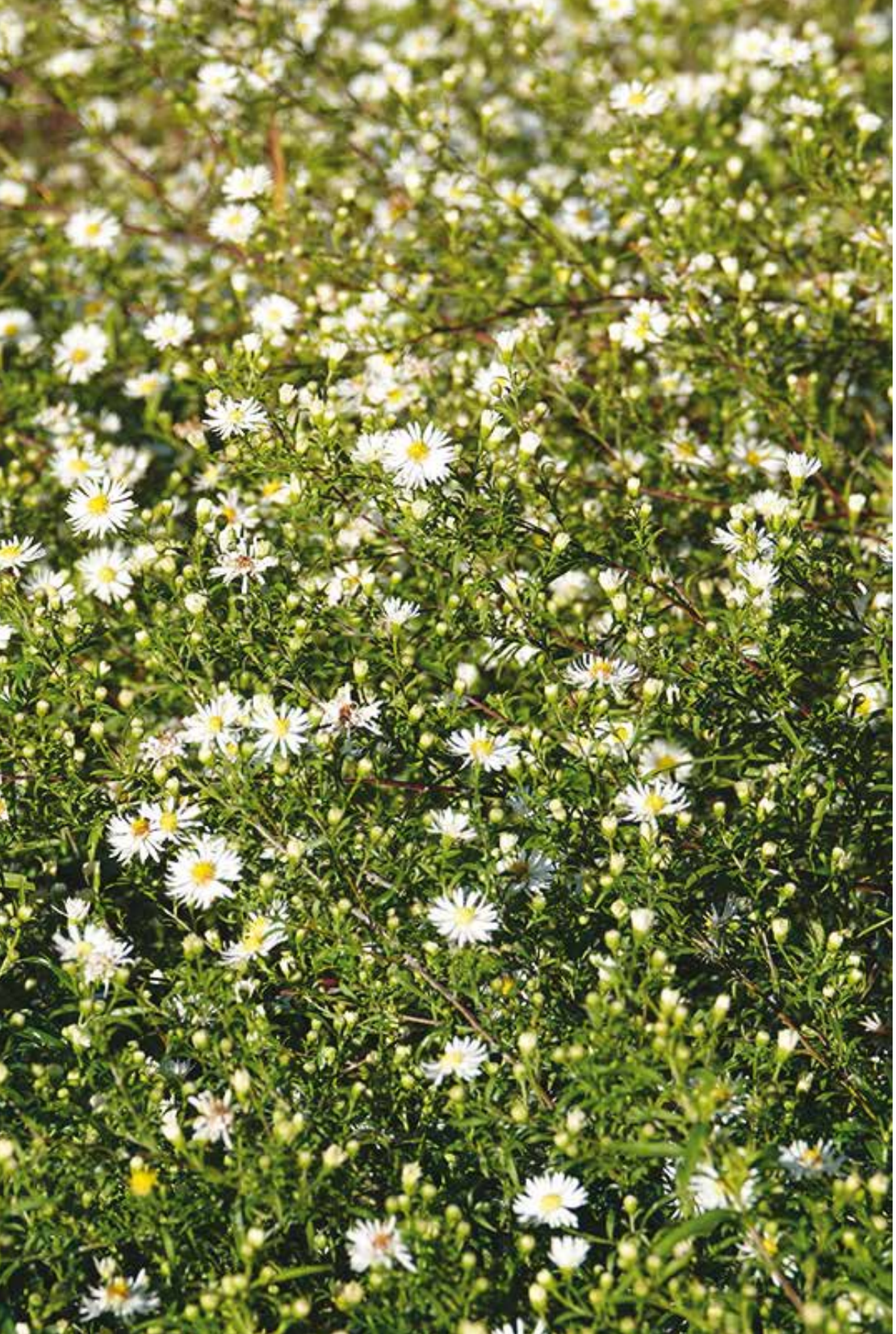
INSECTS

Chapter title page: ***Halyomorpha halys***, archive of Institute Symbiosis
Xylosandrus crassiusculus ❶ Luke Tembrock (Bugwood.org), ❷ Yiři Hulcr (University of North Carolina), ❸ Andrea Minuto (Centro di Saggio, CERSAA)
Anoplophora glabripennis ❶ Matteo Maspero (Fondazione Minoprio), ❷ Thomas B. Denholm (New Jersey Department of Agriculture, Bugwood.org), ❸ Franck Hérard (European Biological Control Laboratory)
Anoplophora chinensis ❶ Changhua Coast Conservation Action, ❷ Anne-Sophie Roy (European Plant Protection Organisation), ❸ Art Wagner (USDA-APHIS, Bugwood.org)

Aromia bungii ❶ ❷ ❸ Bayerische Landesanstalt für Landwirtschaft
Callidiellum rufipenne ❶ Hervé Bouyon, ❷ Connecticut Agricultural Experiment Station, Connecticut Agricultural Experiment Station, Bugwood.org, ❸ Milka Glavendekić
Agrilus bilineatus ❶ Chris Kratzer (CC-BY-NC), ❷ ❸ Steven Katovich, USDA Forest Service, Bugwood.org
Agrilus planipennis ❶ Debbie Miller, USDA Forest Service, Bugwood.org, ❷❸ Dušan Jurc
Popillia japonica ❶ ❷ David Cappaert (Bugwood.org), ❸ Steven Katovich (USDA Forest Service, Bugwood.org)
Leptoglossus occidentalis ❶ Paul Veenvliet
Halyomorpha halys ❶ Jernej Polajnar, ❷❸ David R. Lance (USDA Aphis PPQ)
Metcalfa pruinosa ❶ ❷ ❸ Cristina Preda
Dreyfusia nordmannianae ❶ M. Zúbrik, NFC, ❷ ❸ Milka Glavendekić
Corythucha ciliata ❶ Whitney Cranshaw (Colorado State University, Bugwood.org), ❷ James Solomon (USDA Forest Service, Bugwood.org), ❸ archive of Institute Symbiosis
Corythucha arcuata ❶ Jeff Hahn (University of Minnesota), ❷ Varga András, ❸ Joseph Berger (Bugwood.org)
Dryocosmus kuriphilus ❶ archive of Institute Symbiosis, ❷ György Csóka (Hungarian Forest Research Institute, Bugwood.org), ❸ Fabio Stergulc (University of Udine, Bugwood.org)
Aproceros leucopoda ❶ Dušan Jurc, ❷❸ György Csoka (Hungarian Forest Research Institute, Bugwood.org)
Vespa velutina ❶ Charles J. Sharp (CC BY-SA 4.0), ❷ Sarang Tebuan Haji (CC BY-SA 3.0)
Cameraria ohridella ❶❷❸ archive of Institute Symbiosis
Antheraea yamamai ❶ Clemens Nestroy (CC-BY-SA-2.5, GNU FDL), ❷ Harald Süpfle (CC BY-SA 3.0), ❸ Tony Pittaway (CC BY-SA 3.0)
Cydalima perspectalis ❶❷❸ archive of Institute Symbiosis

BIRDS AND MAMMALS

Chapter title page: ***Sciurus carolinensis***, Jim Ferguson (CC BY 2.0)
Leiothrix lutea ❶ Drew Avery (CC BY 2.0)
Sinosuthora webbiana ❶ Liu JimFood (CC BY-NC)
Eutamias sibiricus ❶ Yves Adams (Vilda Photo)
Sciurus carolinensis ❶ Rollin Verlinde (Vilda Photo)
Tamiosciurus hudsonicus ❶ Peter Waycik (CC 0)
Callosciurus erythraeus ❶ Israel Didham
Nasua nasua ❶ Lado Kutnar
Procyon lotor ❶ David Menke (US Fish and Wildlife Service)
Nyctereutes procyonoides ❶ Karlakas (CC BY-SA 3.0)
Muntiacus reevesi ❶ Nilfanion (CC BY SA 3.0)



Species names in European languages

This list of common names is the result of a joint effort by the authors to bring the information that the book contains to readers who are non-native English speakers. Although the text is in English and thus requires a certain command of the language to understand the contents down to the smallest detail, the information on each species contains enough illustrative material to grasp the general message and to be able to identify the species in question.

The preparation of this list, however, has also yielded unexpected results, the most interesting being that many species already present in a given area have not yet been "assigned" a common name. These species are named, if they are named in some way, with an adaptation of the scientific name (which we have not included in this list). Why is this? We have some possible explanations, not exhaustive. For example, it may be that the presence of the species is very recent and, therefore, has not yet been "baptized". It may also be that, despite being present in a given area for a long time, there has not been an important effort by the competent authorities to communicate its presence to the community. Finally, it may also be that the rate of entry of invasive alien species is so high that the competent authorities do not have time to track them correctly in order to assess the degree of invasiveness of a particular species. It might also be that the common names of certain species have been overlooked in certain languages. We apologize in advance if this proves to be the case. In other instances, we have noted that the list of common names for a given invasive alien species is long and bears no relation to the extent of the linguistic area it occupies. For example, there are species that in Catalan have up to 6 different common names, whereas the same species in Germany, covering a much larger area, appears to have only one. In these cases, we have decided to limit the common names listed to two (without wishing to diminish the others in use).

This list was compiled with the help of resarchers who are working on alien species, and was led by Bernat Claramunt. We thank to: Alien CSI (Bosnian), Vladimir Vladimirov & Rumen Tomov (Bulgarian), Bernat Claramunt & Roser Rotchés (Catalan), Dinka Matošević & Božena Mitić (Croatian), Jan Pergl (Czech), Tim Adriaens & Lien Reyserhove (Dutch), Riho Marja (Estonian), Alien CSI (Finnish), Guillaume Gigot (French), Alien CSI (German), Margarita Arianoutsou, Ioannis Bazos, Pinelopi Delipetrou, Yannis Kokkoris, Andreas Zikos, Anastasia Christopoulou, Sevasti Zervou (Greek), Nir Stern (Hebrew), Gábor Vétek (Hungarian), Giuseppe Brundu & Elena Tricarico (Italian), Jurga Motiejūnaitė (Lithuanian), Christian Reis (Luxembourgish), Norwegian (Toril Loennechen Moen), Anna Gazda & Dariusz Kamiński (Polish), Iolanda Silva Rocha & Elizabete Marchante (Portugese), Alien CSI (Romanian), Milka Glavendekić, Ivana Bjedov, Dragana Marisavljević & Ana Anđelković, (Serbian), Alien CSI (Slovak), Jana Kus Veenvliet (Slovenian), Alien CSI (Spanish), Alien CSI (Swedish).

Page number(s)	36,37	169	170,171	32, 33, 34, 35	90,91	62,63	68,69
Scientific name	***Acer negundo***	***Agrilus bilineatus***	***Agrilus planipennis***	***Ailanthus altissima***	***Akebia quinata***	***Amelanchier lamarckii***	***Amorpha fruticosa***
English	Boxelder	Two-lined chestnut borer	Emerald ash borer	Tree-of-heaven	Chocolate vine	Juneberry	False indigo
Bosnian	Američki javor	Dvoredi kestenov bušnjak	Jasenov krasac	Pajasen	Čokoladna loza	Merala	Bagremac
Bulgarian	Ясенолистен явор		Ясенов агрилус	Айлант, китайски ясен	Шоколадова лоза	Ламаркова ирга	Черна акация, аморфа
Catalan	Auró americà, negundo, auró de fulla de freixe			Ailant, vernís del japó	Akebia		Amorfa
Croatian	Negundovac, američki javor		Jasenov krasnik	Žljezdasti pajasen, rajsko stablo		Lamarckova merala, lamarckova hruščica	Čivitnjača, amorfa, bagremac
Czech	Javor jasanolistý	Polník	Polník	Pajasan žláznatý	Akébie pětičetná	Muchovník lamarckův	Netvařec křovitý
Dutch	Vederesdoorn	Gestreepte kastanjeprachtkever	Aziatische essenprachtkever	Hemelboom	Klimaugurk	Amerikaans krentenboompje	Indigostruik
Estonian	Saarvaher			Näärmeline jumalapuu	Viietine akeebia	Lamarci toompihlakas	Harilik kaunpõõsas (harilik amorfa)
Finnish						Rusotuomipihlaja	
French	Érable à feuilles de frêne			Faux vernis du japon	Akébie à cinq feuilles	Amélanchier de lamarck	Indigo bâtard
German	Eschenahorn			Drüsiger götterbaum	Fingerblättrige akebie	Kupfer-felsenbirne	Gewöhnlicher bastardindigo
Greek				Βρωμοκαρυδιά, βρωμόδεντρο	Ακέμπια ή αναρριχώμενο σοκολατόφυτο	Αρωνία η κοινή	
Hebrew	ילמ רדא			תיטולב התנליא		רייכנלמא	
Hungarian	Zöld juhar		Kőrisrontó karcsúdísz-bogár	Bálványfa	Ötlevelű folyon-dárkékhüvely	Rézvörös fanyarka	Gyalogakác
Italian	Acero americano	Minatore delle fagaceae	Minatore smeraldino del frassino	Albero del paradiso, ailanto	Akebia a cinque punte	Pero corvino nord-amer-icano	Falso indicaco, amorfa, indaco bastardo, gaggia
Lithuanian	Uosialapis klevas			Aukštasis ailantas	Stambiavaisė akebija	Lamarko medlieva	Krūminė amorfa
Luxembourgish	Eschen-äerchen			Himmelsbam		Amerikanesch leebirchen	
Norwegian	Asklønn		Asiatisk askepraktbille	Gudetre		Kanadablåhegg	
Polish	Klon jesionolistny		Opiętek jesionowiec	Bożodrzew gruczołowaty, ajlant wyniosły	Akebia pięciolistkowa	Świdośliwka lamarcka, świdośliwa lamarcka	Amorfa krzewiasta, indygowiec krzewiasty
Portuguese	Bordo-comum		Besouro-verde	Espanta-lobos	Trepadeira-chocolate		Índigo-bastardo
Romanian	Artar american			Cenusar, fals otetar	Vita de ciocolata	Arbore de stafide	Amorfa, salcam mov, salcam mic
Serbian	Пајавац		Јасенов красац	Кисело дрво	Акебија	Ирга	Багремац
Slovak	Javorovec jaseňolistý	Krasoň gaštanový	Krasoň jaseňový	Pajaseň žliazkatý	Akébia päťpočetná	Muchovník lamarckov	Beztvarec krovitý
Slovenian	Ameriški javor	Dvoprogasti krasnik	Jesenov krasnik	Veliki pajesen	Čokoladna akebija	Šmarna hrušica	Navadna amorfa
Spanish	Arce negundo	Barrenador de castañas de dos líneas	Barrenador esmeralda del fresno	Ailanto, árbol del cielo			Falso índigo
Swedish	Asklönn			Gudaträd	Fembladig akebia	Kopparröd häggmispel	Segelbuske

Page number(s)	163, 164, 165	163, 164, 165	188,189	183	108	166,167	64,65
Scientific name	***Anoplophora chinensis***	***Anoplophora glabripennis***	***Antheraea yamamai***	***Aproceros leucopoda***	***Araujia sericifera***	***Aromia bungii***	***Aronia x prunifolia***
English	Citrus longhorn beetle	Asian longhorn beetle	Japanese oak silk moth	Zigzag elm sawfly	Cruel plant, moth plant	Red-necked longicorn	Purple chokeberry
Bosnian	Azijska strizibuba	Azijska dugoroga strizibuba	Japanski svileni moljac	Osa listarica			Ljubičasta aronija
Bulgarian	Китайски сечко	Азиатски сечко	Японска копринена пеперуда	Брястова листна оса		Червеноврат сечко	Сливолистна арония, пурпурна арония
Catalan					Miraguà fals, aràujia, miraguà de jardí		
Croatian	Azijska strizibuba	Azijska strizibuba	Japansko noćno paunče	Brijestova osa listarica	Okrutna biljka		Ljubičasta aronija
Czech			Martináč dubový				Temnoplodec třešňolistý
Dutch	Oost-aziatische boktor	Aziatische boktor	Japanse zijdemot	Iepenzigzagbladwesp		Roodnekboktor	Appelbes
Estonian	Hiina sikk	Aasia puidusikk					
Finnish							
French							Arone noire
German							Schwarze eberesche
Greek			Γιαπωνέζικος μεταξοσκώληκα	Λευκόποδο ζιγκ ζαγκ υμενόπτερο της φτελιάς	Αραούγια η μεταξοφόρο		
Hebrew	תיניס תינורקי	תיתייסא תינורקי			תינייושמ היורא		
Hungarian	Szemcséshátú csillagoscincér	Simahátú csillagoscincér	Tölgyselyemlepke	Kanyargós szillevél-darázs	Tüskegyilok		Szilvalevelű törpeberkenye
Italian	Tarlo asiatico	Tarlo asiatico	Falena cinese della quercia	Argide dell'olmo	Albero della seta	Cerambicide dal collo rosso, cerambicide delle drupacee	Aronia
Lithuanian	Citrinmedinis ūsuotis	Rytinis ūsuotis			Baltažiedis kapšenis		Slyvalapė aronija
Luxembourgish	zitrus-bockkiewerlek	Asiatesche bockkiewerlek					
Norwegian							Purpursurbær
Polish	Kózka cytrusowa	Kózka azjatycka	Jedwabnik dębowy				Aronia śliwolistna
Portuguese	besouro-citrico-de-chifre-longo	Besouro-asiático	Mariposa-de-seda-japonesa		Sumaúma-bastarda		
Romanian							Scorus negru
Serbian	Кинеска Стрижибуба	Азијска Стрижибуба	Јапанска Храстова Свилопреља	Брестова Оса Листарица			Љубичастоплодна Аронија
Slovak	fuzáč citrusový	Fuzáč ázijský	Okáň dubový	Piliaročka brestová	Araužia		Arónia čerešňolistá
Slovenian	Kitajski kozliček	Azijski kozliček	Japonska sviloprejka	Brestova grizlica	Arauja	Rdečevratni kozliček	Aronija
Spanish		Escarabajo asiático de cuernos largos	Polilla de seda japonesa		Planta cruel, miraguano		
Swedish					Fjärilsgömma		Slånaronia

Page number(s)	145	48, 49	48, 49	46, 47, 82, 83	139	28,29	84,85
Scientific name	***Atropellis piniphila***	***Berberis aquifolium***	***Berberis bealei***	***Berberis thunbergii***	***Biscogniauxia mediterranea***	***Broussonetia papyrifera***	***Buddleja davidii***
English	Atropellis canker, branch canker of pine	Oregon grape	Leatherleaf mahonia	Japanese barberry	Charcoal disease of oak	Paper mulberry	Butterfly bush
Bosnian				Tunbergova žutika		Dudovac	
Bulgarian		Червени пръстеновидни ивици по иглиците на бора	Южноамериканско носато мече	Тунбергиев кисел трън		Книжно дърво	Кедъров сечко
Catalan		Mahònia				Morera de paper, morera de xina	Budleia
Croatian		Vazdalisna mahonija, oštrolisna mahonija	Bealeova mahonija	Tunbergova žutika		Japanski dud, dudovac	Budleja, ljetni jorgovan
Czech		Mahónie cesmínolistá	Mahónie bealeova	Dřišťál thunbergův	Káčovka	Papírovník čínský, brousonetie papíronosná	Komule davidova
Dutch		Mahonie	Hulstberberis	Japanse berberis		Papiermoerbei	Vlinderstruik
Estonian		Läiklehine mahoonia	Hubei mahoonia	Thunbergi kukerpuu		Harilik paberimooruspuu	Davidi budleia
Finnish		Mahonia		Japaninhappomarja			
French		Mahonia		Épine-vinette du japon		Mûrier à papier	Buddleja du père david
German		Mahonie		Thunbergs berberitze	Südliche kohlenbeere	Papiermaulbeerbaum	
Greek							
Hebrew		וגרוא ופג		תינפי תירברב		ריינ תות	דוד תילדוב
Hungarian		Mahónia	Törzses mahónia	Japán borbolya		Papíreperfa	Nyáriorgona
Italian	Cancro rameale dei pini	Uva dell'oregon	Crespino di beale, mahonia di beale	Berberis di thunberg, crespino di thunberg	Cancro carbonioso	Gelso da carta	Albero delle farfalle
Lithuanian		Dyglialapė mahonija		Tunbergo raugerškis		Tikrasis popiermedis	Paprastoji budlėja
Luxembourgish		Gewéinlech mahonie					
Norwegian		Mahonie		Høstberberis			
Polish		Mahonia pospolita, ościał pospolity	Mahonia beala	Berberys thunberga		Brusonecja chińska	Budleja dawida
Portuguese		Maónia	Maónia	Bérberis-japonês	Carvão-do-entrecasco	Amoreira-do-papel	Flor-de-mel
Romanian				Dracila japoneza			
Serbian		Махонија		Тунбергова жутика		Јапански дуд	Летњи јоргован
Slovak		Mahónia cezmínolistá	Mahónia bealova	Dráč thunbergov		Papierovník čínsky	
Slovenian	Borov črni rak		Ustnjatolistna mahonija	Thunbergov češmin	Pooglenitev hrastov	Navadna papirjevka	Metuljnik, davidova budleja
Spanish		Uva de oregón, mahonia	Mahonia hoja de cuero y mahonia japonesa.	Agracejo rojo	Chancro carbonoso	Papelero, morera del papel, mora turca	
Swedish		Mahonia	Kinesisk mahonia	Japaninhappomarja		Pappersmullbär	

Page number(s)	168	200	186	42,43	26,27	148	130,131
Scientific name	***Callidiellum rufipenne***	***Callosciurus erythraeus***	***Cameraria ohridella***	***Catalpa bignonioides***	***Celtis occidentalis***	***Ceratocystis platani***	***Cirsium candelabrum***
English	Japanese cedar longhorn beetle	Pallas's squirrel	Horse-chestnut leaf miner	Southern catalpa, cigartree	Hackberry, common hackberry	Canker stain of plane	Candelabra thistle
Bosnian				Južna katalpa, cigaraš	Američki koprivić		
Bulgarian	Катерица на палас		Кестенов листоминираш молец	Бигнониева каталпа	Западна копривка	Увяхване по чинара	Свещникова паламида
Catalan			Minador del castanyer d'índies, camerària	Catalpa			
Croatian			Kestenov moljac miner	Katalpa	Američki koprivić		Osjak litavac
Czech		Veverka pallasova	Klíněnka jírovcová	Katalpa trubačovitá	Břestovec západní		Pcháč
Dutch	Cypresboktor	Pallas' eekhoorn	Paardenkastanjemineermot	Trompetboom			
Estonian		Pune-kabeorav		Harilik trompetipuu	Läänetseltis		
Finnish							
French		Écureuil à ventre rouge	Mineuse du marronnier	Catalpa de caroline	Bois inconnu		
German			Rosskastanien-miniermotte, biergartenmotte	Gewöhnlicher trompetenbaum	Amerikanischer zürgelbaum		
Greek			Υπονομευτής της ιπποκαστανιάς				
Hebrew				תינוגיב הפלטק			
Hungarian		Csinos tarkamókus	Vadgesztenyelevél-aknázómoly	Szivarfa	Ostorfa		
Italian	Cerambicide giapponese	Scoiattolo di pallas	Minatrice fogliare dell'ippocastano	Albero dei sigari	Bagolaro americano, bagolaro occidentale	Cancro colorato del platano	Cardo candelabro
Lithuanian		Palaso voverė	Kaštoninė keršakandė	Paprastoji katalpa	Vakarinis celtis		
Luxembourgish			Päerdskäschtebam-minnematt				
Norwegian							
Polish		Wiewiórczak rdzawobrzuchy	Szrotówek kasztanowcowiaczek	Surmia zwyczajna, katalpa bignoniowa, katalpa zwyczajna, surmia bignoniowa	Wiązowiec zachodni		
Portuguese		Esquilo-de-barriga-vermelha	Lagarta-mineira-do-castanheiro	Catalpa	Lodão-americano	Cancro-colorido-do-plátano	
Romanian			Molia miniera a frunzelor de castan	Catalpa	Sambovina		
Serbian	Јапанска стрижибуба		Минер дивљег кестена	Каталпа	Амерички коприви ћ	Рак платана	
Slovak	Fuzáč	Veverica červenkavá	Ploskáčik pagaštanový	Katalpa bignóniovitá	Brestovec západný		
Slovenian		Pallasova veverica lepotka	Kostanjev listni zavrtač	Navadni cigarovec	Ameriški koprivovec	Platanov obarvani rak	Svečniški osat
Spanish		Ardilla de pallas	Minero de hojas de castaño de indias	Catalpa común	Almez americano		
Swedish		Rödmagad ekorre	Kastanjemal	Katalpa	Bäralm		

Page number(s)	110,111	72, 73, 78, 79	180,181	154, 180, 181	66,67	146	138
Scientific name	***Commelina communis***	***Cornus sericea***	***Corythucha arcuata***	***Corythucha ciliata***	***Cotoneaster horizontalis***	***Cronartium ribicola***	***Cryphonectria parasitica***
English	Asiatic dayflower	Red osier	Oak lace bug	Sycamore lace bug	Wall cotoneaster	White pine blister rust	Chestnut blight
Bosnian							
Bulgarian	Обикновена комелина	Американски бял дрян		Дъбова коритуха	Чинарова коритуха	Хоризонтален котонеастер	Ендотиев рак по кестена
Catalan				Tigre del plàtan	Cotoneaster		Xancre del castanyer
Croatian	Azijska komelina	Crveni drijenak	Hrastova mrežasta stjenica	Platanina mrežasta stjenica	Dunjarica, mušmulica	Upala kore američkog borovca	Rak kestenove kore
Czech	Křížatka obecná	Svída výběžkatá	Síťnatka	Síťnatka	Skalník	Rez vejmutovková, měchýřnatka vejmutovková	
Dutch	Gewone commelina	Canadese kornoelje	Eikennetwants	Platanennetwants	Vlakke dwergmispel	Zwartebessenroest	Kastanjekanker
Estonian	Harilik kommeliin	Võsund-kontpuu			Tuhkpuu	Männi-koorepõletik	
Finnish		Lännenpensaskanukka					
French		Hart rouge	Punaise reticulée du chêne	Punaise reticulée du platane			
German		Weißer hartriegel		Platanen-netzwanze	Zwergmispel		
Greek							
Hebrew					תישובח	הדולחה תיחופלש	
Hungarian	Kommelína		Tölgycsipkéspoloska	Platán-csipkéspoloska	Madárbirs	Ribiszkerozsda	A gesztenye krifonektriás kéregelhalása
Italian	Erba miseria asiatica, commelina comune	Corniolo sericeo	Tingide della quercia	Tingide del platano	Cotognastro, cotonastro	Ruggine vescicolosa	Cancro corticale del castagno
Lithuanian	Paprastoji komelina	Palaipinė sedula			Kaulenis	Serbentinė veimutrūdė	Parazitinė duobiaspuogė
Luxembourgish				Platanen-netzwanz	Fächer-zwergmëspel		
Norwegian	dagblom	Alaskakornell			Mispel	Solbærfiltrust	
Polish	komelina pospolita	Dereń rozłogowy		Prześwietlik platanowy	Irga pozioma		
Portuguese	tradescância			Percevejo-de-renda do plátano	Cotoneaster		
Romanian							
Serbian		Златни дрен	Храстова мрежаста стеница	Платанова мрежаста стеница	Полегла дуњарица	Рђа коре петоигличавих борова	Рак коре питомог кестена
Slovak	Podenka obyčajná	Svíb výbežkatý	Sietnička dubová	Sietnička platanová	Skalník rozprestretý		
Slovenian	Navadna komelina	Sivi dren	Hrastova čipkarka	Platanova čipkarka	Polegla panešplja	Mehurjevka zelenega bora, ribezova rja	Kostanjev rak
Spanish	Canutillo de cuba, asango del japón				Griñolera	Roya del pino blanco	Cancro del castaño
Swedish		Videkornell			Oxbär		Kastanjesjuka

Page number(s)	141	190	106,107	74,75	155,156	179	182
Scientific name	***Cryptostroma corticale***	***Cydalima perspectalis***	***Delairea odorata***	***Deutzia scabra***	***Dothistroma septosporum***	***Dreyfusia nordmannianae***	***Dryocosmus kuriphilus***
English	Sooty bark disease	Box tree moth	Cape ivy	Fuzzy deutzia	Dothistroma blight	Silver fir wooly adelgid	Oriental chestnut gall wasp
Bosnian						Uš jelovih iglica	
Bulgarian		Чимширов молец		Кестенова галова оса	Теснолистна миризлива върба	Бодлива миризлива върба	Мана по чинара
Catalan		Eruga del boix					Vespeta del castanyer
Croatian		Šimširov moljac		Obična dojcija	Smeđa pjegavost borovih iglica, crvena pjegavost borovih iglica	Uš jelova izboja	Kestenova osa šiškarica
Czech		Zavíječ zimostrázový		Trojpuk drsný	Braničnatka	Korovnice kavkazská	
Dutch	Roetschorsziekte	Buxusmot	Kaapse klimop	Roze deutzia	Rode band-bacterievuur	Kaukasische sparrenluis	Oosterse tamme-kastanjegalwesp
Estonian				Kare deutsia			
Finnish							
French			Lierre d'allemagne	Deutzia			Cynips du châtaignier
German			Salonefeu			Tannentrieblaus	
Greek						Αφίδα με φυμάτις της ελάτης	
Hebrew							
Hungarian		Selyemfényű puszpáng-moly	Fokföldiborostyán	Érdeslevelű gyöngyvirágcserje	Vörössávos tűlevél-elhalás	Jegenyefenyő-hajtástetű	Szelídgesztenye-gubacsdarázs
Italian	Malattia della corteccia fuligginosa degli aceri	Piralide del bosso	Senecione profumato, senecione mikanioide	Deuzia	Malattia bande rosse aghi di pino	Afide dell'abete di nord-mann	Cinipide del castagno
Lithuanian			Kvapusis klevedris	Šiurkščioji deucija	Pušinė dotistroma		
Luxembourgish		Pällemmatt					
Norwegian							
Polish		Ćma bukszpanowa		Żylistek szorstki		Obiałka pędowa, obiałka kaukaska	
Portuguese		Traça-do-buxo	Erva-de-são-tiago	No common name	Doença-dos-anéis-ver-melhos		Vespa-das-galhas-do-castanheiro
Romanian							
Serbian		Шимширов пламенац			Црвена прстенаста пегавост четина	Јелин хермес	Шишаруша питомог кестена
Slovak			Delairea voňavá				
Slovenian	Sajasto odmiranj skorje	Pušpanova vešča	Južnoafriški bršljan	Navadna dojcija	Rdeča pegavost borovih iglic	Jelova uš	Kostanjeva šiškarica
Spanish		Polilla del boj, piral del boj	Hiedra alemana, senecio oloroso		Banda roja del pino		Avispilla del castaño
Swedish		Buxbomsmott	Sommarmurgröna			Silvergranlus	

Page number(s)	70,71	70,71	128,129	154	196,197	142	92,93
Scientific name	***Elaeagnus angustifolia***	***Elaeagnus pungens***	***Erigeron annuus***	***Erysiphe platani***	***Eutamias sibiricus***	***Eutypella parasitica***	***Fallopia baldschuanica***
English	Russian olive	Thorny olive	Annual fleabane	Plane-tree powdery mildew	Siberian chipmuk	Eutypella canker of maple	Russian vine
Bosnian							
Bulgarian	Азиатски бурундук	Рак по явора			Сахалинска фалопия	Американски ясен	Пенсилвански ясен
Catalan	Arbre del paradís, arbre argentat, cínamom, olivera del paradís, arbre de plata		Estenactis		Esquirol llistat siberià, esquirol de corea		Teixidor vermell, vinya del tíbet, fajol de l'índia
Croatian	Uskolisna zlolesina, dafina	Mirisava vrba				Rak javorove kore	Grmolika heljda
Czech	Hlošina úzkolistá	Hlošina pichlavá	Turan roční		Burunduk	Bradavkatka parazitická	Opletka čínská
Dutch	Smalle olijfwilg	Stekelige olijfwilg	Zomerfijnstraal		Siberische grondeekhoorn		Chinese bruidssluier
Estonian	Ahtalehine hõbepuu	Torkav hõbepuu	Üheaastane õnnehein				Keskaasia konnatatar
Finnish							
French	Chalef	Oléastre épineux	Érigéron annuel		Tamia de sibérie		
German	schmalblättrige ölweide						Silberregen
Greek	Μοσχοϊτιά, τζιτζιφιά				Σιβηρικό σκίουρος		
Hebrew	זיסכמ וורהצי	דקונמ וורהצי					
Hungarian	Ezüstfa	Örökzöld ezüstfa	Egynyári seprence	Platánlisztharmat	Szibériai csíkosmókus		Tadzsikiszalag
Italian	Olivo di boemia	Olivagno spinoso, oliva spinosa	Cespica annua	Oidio o mal bianco del platano	Scoiattolo giapponese o tamia siberiano	Cancro dell'acero	Poligono baldschuanico, poligono del turkestan, poligono di aubert
Lithuanian	Siauralapis žilakrūmis	Dygusis žilakrūmis	Vienmetė šiušelė		Azijinis burundukas		
Luxembourgish							
Norwegian	Smalsølvbusk				Sibirstripeekorn		Klatreslirekne
Polish	Oliwnik wąskolistny, oliwnik zwyczajny	Oliwnik kłujący	Przymiotno białe		Burunduk syberyjski		Rdestówka bucharska, rdestówka auberta, fallopia bucharska, rdest bucharski
Portuguese	Árvore-do-paraíso	Oliveira-do-paraíso		Oídio-do-plátano	Esquilo-da-sibéria		Cordão-prateado
Romanian	salcioara						Troscot japonez
Serbian				Пепелница платана			Руска винова лоза
Slovak	Hlošina úzkolistá	Hlošina pichľavá					Pohánkovec baldžuánsky
Slovenian	Ozkolistna oljčica	Bodeča oljčica	Enoletna suholetnica	Platanova pepelovka	Sibirski burunduk	Javorov rak	Grmasti slakovec
Spanish	Árbol del paraíso	Eleagno, cinamomo			Ardilla de siberia, ardilla coreana		Correquetepillo, enredadera rusa, viña del tíbet
Swedish	smalbladig silverbuske						Silverregn

Page number(s)	92,93	118,119	40,41	40,41	144	140	176,177
Scientific name	***Fallopia multiflora***	***Fallopia sachalinensis***	***Fraxinus americana***	***Fraxinus pennsylvanica***	***Fusarium circinatum***	***Geosmithia morbida***	***Halyomorpha halys***
English	Chinese knotweed, tuber fleeceflower	Giant knotweed, sakhalin knotweed	White ash, american ash	Green ash	Pitch canker of pine	Thousand cankers disease	Brown marmorated stink bug
Bosnian			Američki jasen	Pensilvanski jasen			
Bulgarian			Кафява мраморна дървеница	Мантегацианов девисил	Персийски девисил	Сосновски девисил	
Catalan			Freixe blanc d'amèrica	Freixe americà			Bernat marbrejat
Croatian		Sahalinski dvornik	Američki jasen	Pensilvanijski jasen			
Czech		Křídlatka sachalinská	Jasan americký	Jasan pensylvánský	Srpovnička		Kněžice mramorovaná
Dutch	Chinese duizendknoop	Sachalinse duizendknoop	Amerikaanse es	Pennsylvaanse es			Bruingemarmerde schildwants
Estonian	Õiekas konnatatar	Sahhalini konnatatar	Ameerika saar	Pelsilvaania saar			
Finnish							
French		Renouée de sakhaline	Frêne d'amérique	Frêne de pennsylvanie			
German		Sachalin-knöterich	Weiß-esche	Pennsylvanische esche			
Greek							Η κοινή βρωμούσα της ακτινιδιάς
Hebrew	תיניס תיבוכרא		תיאקירמא הלימ	תינוליסנפ הלימ			
Hungarian	Kelet-ázsiai-iszalag	Óriás japániszalag	Fehér kőris	Vörös kőris	A fenyő szurkos kéregelhalása		Ázsiai márványospoloska
Italian	Poligono multifloro	Poligono di sachalin	Frassino americano, frassino bianco	Frassino della pennsylvania	Cancro resinoso del pino	Cancro rameale del noce	Cimice asiatica, cimice marmorata
Lithuanian			Amerikinis uosis	Plaukuotasis uosis	Suktasis lielius		
Luxembourgish		Sachalin-knuetkraut					
Norwegian		Kjempeslirekne					
Polish	Rdestowiec wielokwiatowy	Rdestowiec sachaliński, falopia sachalińska, rdest sachaliński, rdestówka sachalińska	Jesion amerykański	Jesion pensylwański			
Portuguese			Freixo-americano	Freixo-americano	Cancro-resinoso-do-pinheiro		Percevejo-asiático
Romanian	troscot japonez	Troscot japonez	Frasin american	Frasin de pensilvania			
Serbian			Амерички јасен	Пенсилвански јасен	Смоласти рак бора	Хиљаду рак рана	Мраморастa стеница
Slovak		Pohánkovec sachalínsky	Jaseň americký	Jaseň červený			
Slovenian	Gomoljasti slakovec	Sahalinski dresnik	Ameriški jesen	Pensilvanski jesen	Borov smolasti rak	Bolezen tisočerih rakov	Marmorirana smrdljivka
Spanish	Fo-ti o fo-ti-teng	Musaraña gigante o musaraña de sakhalin	Fresno blanco americano, fresno de la carolina, fresno americano o fresno blanco	Fresno rojo americano, fresno verde	Cancro resinoso del pino		Chinche parda marmorada, chinche hedionda marrón marmoleada
Swedish			Vitask	Rödask			Brunspräcklig bärfis

Page number(s)	132,133	132,133	132,133	137	94,95	150,17	122,123
Scientific name	***Heracleum mantegazzianum***	***Heracleum persicum***	***Heracleum sosnowskyi***	***Heterobasidion irregulare***	***Humulus scandens***	***Hymenoscyphus fraxineus***	***Impatiens balfourii***
English	Giant hogweed	Persian hogweed	Sosnowsky's hogweed	Heterobasidion root disease, annosus root and butt rot	Japanese hop	Ash dieback	Balfour's touch-me-not
Bosnian							
Bulgarian	Японски хмел, див хмел		Балфуриева слабонога	Жлезиста слабонога	Дребноцветна слабонога	Китайски мехурник	
Catalan	Julivert gegant, bellaraca gegant, pampa del caucas				Llúpol japonès		Balsamina de balfour
Croatian	Gigantska šapika	Perzijska šapika					Balfourov nedirak, kašmirski nedirak
Czech	Bolševník velkolepý	Bolševník perský	Bolševník sosnowského	Kořenovník	Chmel japonský	Voskovička jasanová	Netýkavka balfourova
Dutch	Reuzenberenklauw	Perzische berenklauw	Sosnowsky's berenklauw		Japanse hop	Vals essenvlieskelkje	Tweekleurig springzaad
Estonian	Hiid-karuputk	Pärsia karuputk	Sosnovski karuputk		Jaapani humal	Saaresurm	
Finnish	Kaukasianjättiputki	Persianjättiputki					
French	Berce géante du caucase				Houblon du japon		Impatiente des jardins
German	Riesenbärenklau		Sosnowsky bärenklau		Japanischer hopfen		Balfours springkraut
Greek							
Hebrew			יקסבונסוס וואילקרה				
Hungarian	Kaukázusi medvetalp	Perzsa medvetalp	Sosnowsky-medvetalp		Japán komló	Kőriselhalás	Matild-nebáncsvirág
Italian	Panace di mantegazza	Panace della persia	Pance di sosnowskyi	Mal del rotondo	Luppolo del giappone	Disseccamento o deperimento del frassino	Balsamina di balfour
Lithuanian	Mantegacio barštis	Persinis barštis	Sosnovskio barštis			Uosinis uknolūnas	
Luxembourgish	Risebiereklo						Balfour-sprangkraut
Norwegian	Kjempebjørnekjeks	Tromsøpalme			Japanhumle	Askeskuddbeger	
Polish	Barszcz mantegazziego, barszcz kaukaski, barszcz mantegazyjski	Barszcz perski	Barszcz sosnowskiego		Chmiel japoński		Niecierpek balfoura
Portuguese				Podridão-do-cerne		Murchidão-do-freixo	
Romanian							
Serbian					Јапански хмељ		
Slovak	Boľševník obrovský	Boľševník perzský			Chmeľ japonský		Netýkavka balfourova
Slovenian	Orjašk dežen	Perzijski dežen	Sosnowskyjev dežen	Ameriška rdeča trohnoba	Enoletni hmelj, japonski hmelj	Jesenov ožig	Balfourova nedotika
Spanish	Perejil gigante, acanto gigante	Golpar					Nometoques, balsamina, bálsamo de cachemira
Swedish	Sibirisk jättebjörnfloka	Tromsöloka	Bredloka		Japansk humle		Hornbalsamin

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Page number(s)	122,123	124,125	38,39	155,156	192,193	174,175	80,81
Scientific name	***Impatiens glandulifera***	***Impatiens parviflora***	***Koelreuteria paniculata***	***Lecanosticta acicola***	***Leiothrix lutea***	***Leptoglossus occidentalis***	***Ligustrum japonicum***
English	Himalayan balsam, policeman's helmet	Small balsam	Golden rain tree	Brown spot needle blight	Red-billed leiothrix	Western conifer seed bug, leaf-footed conifer seed bug	Japanese privet, wax-leaf privet
Bosnian			Kerleuterija, lampion drvo				
Bulgarian	"Американска западна семенна дървеница по иглолистните"	Японско птиче грозде	Японски нокът	Маакиев нокът	Татарски нокът	Многолистна лупина	Годжи бери, мерджан
Catalan	Balsamina glandulífera		Sapinde de la xina, saboner de xina		Rossinyol del japó	La xinxa americana de la pinya, xinxa dels pinyons	Troana, olivereta
Croatian	Žljezdasti nedirak	Sitnocvjetni nedirak, mali nedirak	Kelreuterija	Smeđa pjegavost borovih iglica			Japanska kalina
Czech	Netýkavka žláznatá	Netýkavka malokvětá	Svitel latnatý	Braničnatka	Timálie čínská	Vroubenka americká	Ptačí zob japonský
Dutch	Reuzenbalsemien	Klein springzaad	Gele zeepboom		Japanse nachtegaal	Bladpootwants	Japanse liguster
Estonian	Verev lemmalts	Väikeseõiene lemmmalts	Harilik kuldpöörispuu				Jaapani ligustriin
Finnish	Jättipalsami	Rikkapalsami			Tulirintatimali		
French	Millefleurs	Impatiente parviflore			Léiothrix jaune	La punaise du pin	
German	Indisches springkraut	Kleines springkraut	Rispiger blasenbaum		Sonnenvogel	Amerikanische kiefern-wanze	
Greek					Αηδόνι του πεκίνου		
Hebrew							ינפי מורטסוגיל
Hungarian	Bíbor nebáncsvirág	Kisvirágú nebáncsvirág	Csörgőfa	Barnafoltos tűlevél-elhalás	Piroscsőrű napmadár	Nyugati levéllábú-poloska	Japán fagyal
Italian	Balsamina ghiandolosa	Balsamina minore	Albero delle lanterne cinesi		Usignolo del giappone	Cimice o cimicione dei pini	Ligustro del giappone
Lithuanian	Bitinė sprigė	Smulkiažiedė sprigė	Gausiažiedė svambuolė, gausiažiedė kelreiterė	Spyglinė lekanostikta	Lejotriksas		Japoninis ligustras
Luxembourgish	Drüse-sprangkraut	Klengt sprangkraut				Amerikanesch kiferwanz	
Norwegian	Kjempespringfrø	Mongolspringfrø			Safrantimal		Japanliguster
Polish	Niecierpek gruczołowaty, niecierpek roylego, niecierpek himalajski	Niecierpek drobnokwia-towy	Roztrzeplin wiechowaty, mydleniec wiechowaty		Pekińczyk czerwonodzio-by, pekinczyk żółty	Wtyk amerykański	Ligustr japoński
Portuguese			Árvore-da-chuva-dourada	No common name	Rouxinol-do-japão	Sugador-das-pinhas	Ligustro-japonês
Romanian	Slabanog de india						
Serbian				Красолика			
Slovak	Netýkavka žliazkatá	Netýkavka malokvetá	Jeseňovec metlinatý		Mezia žltá		Vtáčí zob japonský
Slovenian	Žlezava nedotika	Drobnocvetna nedotika	Latnati mehurnik	Rjavenje borovih iglic	Kitajski slavček	Storževa listonožka	Japonska kalina
Spanish			Sapindal, jabonero de la china		Leiotrix piquirrojo o ruiseñor del japón	Chinche americana del pino	Aligustre, alheña, ligustro
Swedish	Jättipalsami	Rikkapalsami	Kinesträd		Rödnäbbad sångtimalia		Japansk liguster

Page number(s)	52, 53, 80, 81	104,105	76,77	76,77	120,121	82,83	112,113
Scientific name	***Ligustrum lucidum***	***Lonicera japonica***	***Lonicera maackii***	***Lonicera tatarica***	***Lupinus polyphyllus***	***Lycium barbarum***	***Lysichiton americanus***
English	Chinese privet	Japanese honeysuckle	Amur honeysuckle	Tatarian honeysuckle	Garden lupine, large-leaved lupine	Wolfberry, goji berry	American skung cabbage, yellow skunk cabbage
Bosnian							
Bulgarian	Жълт миризлив змиярник	Джелолистна махония		Ръжда по елшата	Цитрусова цикада	Китайски мунтжак	Кафяви петна по иглиците на бора
Catalan	Turbit de muntanya	Xuclamel japonès, lligabosc japonès, mare-selva de jardí				Arç negre, arç de tanques, arçot de tanques	
Croatian	Japanska velelisna kalina	Japanska kozja krv, japanska kozokrvina	Amurska kozja krv, amurska kozokrvina	Tatarska kozja krv, tatarska kozokrvina	Višelisna vučika	Obični vučac, čeminjuga	Američki lisihiton
Czech	Ptačí zob	Zimolez japonský	Zimolez maackův	Zimolez tatarský	Lupina mnoholistá, vlčí bob mnoholistý	Kustovnice cizí, kustovnice kosníkolistá	Kapsovec americký, toulcovka americká
Dutch		Japanse kamperfoelie	Amoer-kamperfoelie	Tartaarse kamperfoelie	Vaste lupine	Boksdoorn	Moeraslantaarn
Estonian	Läikiv liguster	Jaapani kuslapuu	Maacki kuslapuu	Tatari kuslapuu	Hulgalehine hundiuba	Harilik taralõng	Ameerika kevadvõhk
Finnish				Rusokuusama	Komealupiini		
French	Troène de chine	Chèvrefeuille du japon	Clématite de maack	Chèvrefeuille de tartarie	Lupin pérenne	Lyciet commun	Lysichiton
German		Japanisches geißblatt	Maacks heckenkirsche	Tatarische heckenkir-sche	Vielblättrige lupine	Gewöhnlicher bocksdorn	Gelbe scheinkalla
Greek		Αγιόκλημα					
Hebrew	יניס טווירפ	תינפי הרעי	יאקמ הרעי	תירטט הרעי	סומרות		יברעמ שאוב בורכ
Hungarian	Fényeslevelű fagyal	Japán lonc	Koreai lonc	Tatár lonc	Erdei csillagfürt	Ördögcérna	Sárga lápbuzogány
Italian	Ligustro lucido	Caprifoglio del gi-appone, caprifoglio giapponese	Lonicera	Caprifoglio tatarico	Lupino fogliuto, lupino perenne	Spina santa di barberia	Lysichiton americano
Lithuanian	Blizgantysis ligustras	Japoninis sausmedis	Amūrinis sausmedis	Totorinis sausmedis	Gausialapis lubinas	Dygliuotasis ožerškis	
Luxembourgish					Gaarde-luppéng		
Norwegian		Japankaprifol		Tatarleddved	Hagelupin	Bukketorn	Skunkkala
Polish	Ligustr lśniący	Wiciokrzew japoński, suchodrzew japoński	Wiciokrzew maacka, suchodrzew maacka	Wiciokrzew tatarski, suchodrzew tatarski	Łubin trwały	Kolcowój szkarłatny	Tulejnik amerykański
Portuguese	Alfenheiro-do-japão	Madressilva-dos-jardins	Madressilva de maack	Madressilva-de-jardim	Tremoçeiro-de-jardim		
Romanian		Caprifoi japonez, mana maicii domnului		Caprifoi tataresc	Numai sul useken	Goji, catina de garduri	
Serbian		Орлови нокти			Бела лупина	Кинески вучац	
Slovak		Zemolez japonský	Zemolez maackov	Zemolez tatársky	Lupina mnoholistá	Kustovnica cudzia	Tulcovka americká
Slovenian	Bleščeča kalina	Japonsko kosteničje	Maackovo kosteničje	Tatarsko kosteničje	Mnogolistni volčji bob	Navadna kustovnica, goji	Ameriški lizihiton
Spanish		Madreselva	Madreselva de maack, clemátide de maack	Madreselva tatarian	Altramuz perenne o lupino	Escambrón blanco	Col de mofeta occidental, col de mofeta amarilla, linterna de pantano
Swedish		Slingertry	Koreatry	Rusokuusama	Komealupiini	Bocktörne	Skunkkalla

M → N → O

Page number(s)	157	178	205	201	152	202,203	147
Scientific name	***Melampsoridium hiratsukanum***	***Metcalfa pruinosa***	***Muntiacus reevesi***	***Nasua nasua***	***Neonectria neomacrospora***	***Nyctereutes procyonoides***	***Ophiostoma novo-ulmi***
English	Alder rust	Citrus flatid planthopper, mealy flata	Reeves's muntjac	Ring-tailed coati, south american coati	Canker of balsam fir	Raccoon dog	Dutch elm disease
Bosnian							
Bulgarian	Рак по елата	Енотовидно куче	Холандска болест		Павловния, плътновлакнеста павловния		Липов пъстрминиращ молец
Catalan			Muntjac de reeves	Coatí sudamericà		Gos viverrí	
Croatian		Medeći cvrčak	Muntjak	Nosati rakun		Kunopas	Holandska bolest brijesta
Czech		Voskovka zavlečená	Muntžak malý	Nosál červený	Rážovka	Psík mývalovitý	Ofiostoma jilmová
Dutch	Elsroest		Chinese muntjak	Rode neusbeer		Wasbeerhond	Iepenziekte
Estonian			Hiina muntjak	Ninakaru		Kährikkoer	
Finnish			Muntjakki			Supikoira	
French			Muntjac de chine			Chien viverrin	
German			Muntjak	Nasenbär		Marderhund	
Greek		Μετκάλφα		Νοτιοαμερικάνικο κοατί			
Hebrew			יניס קאיטנום	מודא ומטוח		ווקאר לעוש	
Hungarian		Amerikai lepkekabóca	Indiai muntyákszarvas	Koáti		Nyestkutya	Szilfavész
Italian	Ruggine dell'ontano	Metcalfa	Muntjac cinese	Coati	Cancro dell'abete	Cane procione	Grafiosi dell'olmo
Lithuanian			Kininis muntjakas	Paprastasis koatis		Usūrinis šuo	
Luxembourgish						Maardéier-hond	
Norwegian	Orerust					Mårhund	Almesykesopp
Polish			Mundżak chiński	Ostronos rudy, koati		Jenot azjatycki	
Portuguese			Muntjac-chinês	Coati-sul-americano		Cão-guaxinim	Fungo da grafiose
Romanian		Cicada melifera		Coati		Caine enot	
Serbian						Ракунолики пас	Холандска болест бреста
Slovak			Muntžak malý	Nosáľ červený		Psík medviedikovitý	
Slovenian	Japonska jelševa rja	Medeči škržatek	Muntjak	Južnoameriški koati	Sušica jelovih vej	Rakunasti pes	Holandska brestova bolezen
Spanish		Saltamontes plano de los cítricos	Muntjac chino, muntíaco de reeves	Coatí de cola anillada sudamericano, mundi o mishasho		Perro mapache o mapache japonés	Grafiosis o enfermedad holandesa del olmo
Swedish			Kinesisk muntjak			Mårdhund	

Page number(s)	42,43	116,117	187	86,87	58,59	114,115	114,115
Scientific name	***Paulownia tomentosa***	***Persicaria wallichii***	***Phyllonorycter issikii***	***Phyllostachys sp.***	***Physocarpus opulifolius***	***Phytolacca acinosa***	***Phytolacca americana***
English	Royal paulownia, kiri	Himalayan knotweed	Lime leaf miner	Running bamboos	Common ninebark	Indian pokeweed	American pokeweed
Bosnian	Paulovnija						
Bulgarian		Индийски винобой	Американски винобой, лаконос	Фитофтора	Японски бръмбар	Американски енот	Лавровишна
Catalan	Paulònia			Bambú			Raïm de moro, raïm de l'escopeta raïm de sant salvi, arbre de tinta, belladona borda
Croatian	Pustenasta paulovnija		Lipin moljac miner	Bambus	Pucavac	Indijski kermes, indijska vinobojka	Američki kermes, američka vinobojka
Czech	Pavlovnie plstnatá, paulovnie plstnatá	Rdesno mnohoklasé	Klíněnka lipová		Tavola kalinolistá	Líčidlo	Líčidlo americké
Dutch	Anna paulownaboom	Afghaanse duizendknoop	Lindevouwmot	Bamboe	Blaasjesvrucht, sneeuwbalspirea	Oosterse karmozijnbes	Westerse karmozijnbes
Estonian	Viltjas printsessipuu	Himaalaja kirbutatar			Lodjap-põisenelas	Spinat-kermesmari	Ameerika kermesmari
Finnish							
French	Paulownia impérial	Renouée de l'himalaya			Physocarpe à feuilles d'obier		Teinturière
German	Chinesischer blauglock-enbaum	Himalaya bergknöterich					Kermesbeere
Greek							Μαυροστάφυλο
Hebrew	הרודה הינבולופ			סיכטסוליפ			תיאקירמא הקלוטיפ
Hungarian	Császárfa	Szibériai keserűfű	Hárslevél-sátorosmoly	Botnád	Hólyagvessző	Indiai alkörmös	Alkörmös
Italian	Paulownia	Poligono con molte spighe, poligono dell'himalaya	Minatore fogliare del tiglio	Bambù	Spirea americana	Fitolacca indiana	Fitolacca americana, uva turca, amaranto, cremesina
Lithuanian	Kininė paulovnija		Liepinė keršoji kandelė	Didbambukis	Putinalapis pūslenis	Indinė fitolaka	Amerikinė fitolaka
Luxembourgish							
Norwegian		Syrinslirekne				Kermesbær	
Polish	Paulownia omszona	Rdest wielokłosowy		Filostachys	Pęcherznica kalinolistna	Szkarłatka jagodowa	Szkarłatka amerykańska
Portuguese	Paulónia			Bambu	No common name		Tintureira
Romanian	Paulovnie						Carmaz
Serbian	Пауловнија		Липин минер				Винобојка
Slovak	Paulovnia plstnatá	Horčiak mnohoklasý		Pabambus			Líčidlo americké
Slovenian	Pavlovnija	Himalajski dresnik		Bambusi	Kalinolistni pokalec	Krhljasta barvilnica	Navadna barvilnica
Spanish	Paulonia imperial, paulownia imperial, kiri	Nudos del himalaya	Minero de hojas de lima	Bambú		Poke indio, hierba carmín, pokeberry	Hierba carmín, hierba de la oblea, uvas de américa, uvas de indias, espinacas de américa, grana encarnada, granilla, tintilla
Swedish	Kejsarträd		Lindguldmal			Kermesbär	Scharlakansbär

Page number(s)	136,149	172,173	201, 202, 203	52, 53, 80, 81	30,31	96,97	24,25
Scientific name	***Phytophthora spp.***	***Popillia japonica***	***Procyon lotor***	***Prunus laurocerasus***	***Prunus serotina***	***Pueraria montana* var. *lobata***	***Quercus rubra***
English	Phytophthoras	Japanese beetle	Raccoon	Cherry laurel	Black cherry	Kudzu, east-asian arrowroot	Northern red oak
Bosnian					Kasna sremza		Crveni hrast
Bulgarian	Късноцъфтяща гроздовидна череша	Кудзу	Червен дъб, американски дъб	Златисто френско грозде	Многоцветна роза		
Catalan			Ós rentador	Llorer-cirerer, llorer reial	Cirerer americà		Roure americà
Croatian		Japanski pivac	Rakun	Lovorvišnja, zelenče	Kasna sremza, američka sremza	Kudzu	Crveni hrast
Czech	Plíseň	Listokaz japonský	Mýval severní	Bobkovišeň lékařská, střemcha bobková	Střemcha pozdní, střemcha vrbolistá	Puerarie thunbergova, kudzu	Dub červený
Dutch		Japanse kever	Wasbeer	Laurierkers	Amerikaanse vogelkers	Kudzu	Amerikaanse eik
Estonian			Pesukaru	Harilik loorberkirsipuu	Hilistoomingas	Hõlmine pueraaria	Punane tamm
Finnish			Pesukarhu	Laakerikirsikka			Punatammi
French			Raton laveur	Laurier-cerise	Cerisier d'automne	Vigne japonaise	Chêne boréal
German			Waschbär	Lorbeerkirsche	Späte trauben-kirsche		Roteiche
Greek					Αγριοκερασιά		Κόκκινη δρύς
Hebrew	הרופוטיפ	תינפי תישופיח	יוצמ וובידב	הנפד ינבדבוד	רוחש ובדבוד	וזדוק	מודא וולא
Hungarian	Fitoftóra	Japán cserebogár	Mosómedve	Babérmeggy	Kései zelnice	Kínai fojtóbab	Vörös tölgy
Italian	Fitoftora	Coleottero giapponese	Procione, orsetto lavatore	Lauroceraso	Ciliegio tardivo, pruno tardivo	Kudzu	Quercia rossa americana
Lithuanian	Fitoftora		Paprastasis meškėnas	Vaistinė ieva, vaistinė lauravyšnė	Vėlyvoji ieva	Kalninės puerarijos skiautėtasis varietetas	Raudonasis ąžuolas
Luxembourgish			Wäschbier	Lorberkiischt	Spéid drauwekiischt		Rout eech
Norwegian			Vaskebjørn	Laurbærhegg	Romhegg		Rødeik
Polish	Phytophtora	Popilia japońska	Szop pracz	Laurowiśnia wschodnia	Czeremcha amerykańska, czeremcha późna	Opornik łatkowaty, ołownik łatkowaty, kudzu	Dąb czerwony
Portuguese	Doença-da-tinta	Escaravelho-japonês	Guaxinim	Loureiro-cerejeiro	Capolim	Kudzu	Carvalho-americano
Romanian			Raton	Laur englezesc	Cires negru		Stejar rosu american
Serbian	Пламењача				Америчка црна трешња		Црвени храст
Slovak			Medvedík čistotný	Vavrinovec lekársky	Čremcha neskorá	Puerária horská laločnatá	Dub červený
Slovenian	Fitoftore	Japonski hrošč	Rakun	Lovorikovec	Pozna čremsa	Kudzu	Rdeči hrast
Spanish	Tinta	Escarabajo japonés	Mapache común	Laurel cerezo	Cerezo negro americano, capulí		Roble rojo americano, roble boreal rojo americano, roble rojo del norte
Swedish			Tvättbjörn	Körsbärslager	Glanshägg		Rödek

R → S →

Page number(s)	32, 33, 34, 35	50,51	60,61	54,55	198	198	102,103
Scientific name	***Rhus typhina***	***Ribes aureum***	***Rosa multiflora***	***Rubus phoenicolasius***	***Sciurus carolinensis***	***Sciurus niger***	***Sicyos angulatus***
English	Staghorn sumac	Golden currant	Multiflora rose	Wine raspberry, japanese wineberry	Grey squirrel	Fox squirrel	Bur cucumber
Bosnian							
Bulgarian	Източна сива катерица	Лисича катерица			Билардов тъжник	Дугласов тъжник	Наплъстен тъжник
Catalan	Sumac americà		Garlanda		Esquirol gris	Esquirol de bryant	
Croatian	Runjavi ruj, rujevina kisela	Mirisavi ribiz	Višecvjetna ruža	Japanska malina, vinska malina			Dlakavi krastavac, mlunić
Czech	Škumpa orobincová	Meruzalka vonná	Růže mnohokvětá	Ostružiník japonský	Veverka popelavá	Veverka liščí	Libenka
Dutch	Azijnboom	Gele ribes	Veelbloemige roos	Japanse wijnbes	Grijze eekhoorn	Amerikaanse voseekhoorn	Sterkomkommer
Estonian	Äädikapuu (harilik sumahh)	Kuldsõstar	Rohkeõieline kibuvits	Punakarvane vaarikas	Hallorav	Rebasorav	Haakuv krässkõrvits
Finnish					Harmaaorava		
French	Sumac amarante	Gadellier doré	Rosier multiflore	Framboisier du japon	Écureuil gris		Sicyos anguleux
German		Goldjohannisbeere	Vielblütige rose	Rotborstige himbeere	Grauhörnchen		Haargurke
Greek		Μύρτιλλο με χρυσή σταφίδα	Αγριοτριανταφυλλιά η πολυανθής				
Hebrew	יתפיטק גוא		הרולפיטלום הזור		סודא יאנס		
Hungarian	Ecetfa	Illatos ribiszke	Futórózsa	Vörösbolyhú málna	Keleti szürkemókus	Vörös rókamókus	Szögletes gyepűtök
Italian	Sommaco americano	Ribes	Rosa moltiflora	Falso lampone, rovo a peli rossi, uva giapponese	Scoiattolo grigio nordamericano	Scoiattolo volpe	Zucca spinosa, zucchina americana
Lithuanian	Rūgštusis žagrenis	Auksuotojo serbento gauruotasis varietetas	Gausiažiedis erškėtis	Raudondyglė avietė	Pilkoji voverė, karolininė voverė	Juodoji voverė	Kampuotoji rietena
Luxembourgish							
Norwegian		Gullrips	Småklatrerose	Vinbringebær	Østamerikansk gråekorn		Møllegresskar
Polish	Sumak octowiec	Porzeczka złota	Róża wielokwiatowa	Jeżyna rdzawa	Wiewiórka szara	Wiewiórka czarna	Harbuźnik kolczasty
Portuguese	Sumagre-da-virgínia		Roseira-do-japão	Silva	Esquilo-cinzento	Esquilo-raposa	
Romanian		Coacaz auriu	Trandafir japonez	Mur japonez	Veverita cenusie		
Serbian	Кисели руј				Сива веверица	Црна веверица	Јежасти краставац
Slovak		Ríbezľa zlatá	Ruža mnohokvetá	Ostružina japonská	Veverica sivá	Veverica líščia	Ľubienka hranatá
Slovenian	Octovec	Zlati ribez	Mnogocvetni šipek	Rdečeščetinava robida	Siva veverica	Lisičja veverica	Robati kurbusnjak
Spanish		Grosella dorada, grosella oro, grosella buffalo.	Rosa bebé, rosa vaga-bunda		Ardilla gris	Ardilla zorra	Pepino asado, el pepino estrella
Swedish		Doftrips	Japansk klätterros	Rödborstigt björnbär	Gråekorre	Östlig rävekorre	Hårgurka

Page number(s)	194,195	153	57	57	56,57	57	78,79
Scientific name	***Sinosuthora webbiana***	***Sirococcus tsugae***	***Spiraea × billardii***	***Spiraea douglasii***	***Spiraea japonica***	***Spiraea tomentosa***	***Symphoricarpos albus***
English	Vinous-throated parrotbill	Sirococcus shoot blight	Billard's spiraea, hardhack	Douglas spirea	J>apanese spiraea, japanese meadowsweet	Steeplebush	Snowberry
Bosnian							
Bulgarian	Симфиотрихум, звездел		Ръжда по боровинката	Традесканция	Азиатски стършел		Азиатски амброзия бъмбар
Catalan							
Croatian			Bilardova suručica	Duglasova suručica	Japanska suručica	Končara	Biserak
Czech	Sýkořice vínoprsá		Tavolník billardův	Tavolník douglasův	Tavolník japonský	Tavolník plstnatý	Pámelník bílý
Dutch	Bruinkopdiksnavelmees		Bastaardspirea	Douglasspirea	Japanse spirea	Viltige spirea	Sneeuwbes
Estonian			Hambuline enelas	Douglasi enelas	Jaapani enelas	Viltjas enelas	Harilik lumimari
Finnish				Punapajuangervo			
French				Spirée de douglas	Spirée du japon	Thé du canada	Symphorine à fruits blancs
German	Braunkopf-papage-imeise		Billards spierstrauch	Douglas-spierstrauch	Japanischer spierstrauch	Gelbfilziger spierstrauch	
Greek							
Hebrew			האריפס	תידרו האריפס	תינפי האריפס		
Hungarian			Pirosvirágú gyöngyvessző	Kaliforniai bajnóca	Japán gyöngyvessző	Sárgásmolyhú gyöngyvessző	Hóbogyó
Italian	Panuro di webb		Spirea	Spirea	Spirea del giappone	Spirea tomentosa	
Lithuanian	Rudagalvis storasnapis		Bilardo lanksva	Šlaitinė lanksva	Japoninė lanksva		Baltauogė meškytė
Luxembourgish			Billard-kluddertrausch	Douglas-kluddertrausch			
Norwegian	Rosenbuttnebb		Klasespirea	Douglasspirea	Japanspirea	Filtspirea	
Polish	Ogoniatka czubata		Tawuła nibywierzbolistna	Tawuła douglasa	Tawuła japońska, tawuła bumalda, tawuła drobna	Tawuła kutnerowata	Śnieguliczka biała
Portuguese					Spireia-do-japão		No common name
Romanian							
Serbian				Суручица	Златна принцеза, мала принцеза		Бисерак
Slovak			Tavoľník billardov	Tavoľník douglasov	Tavoľník japonský	Tavoľník plstnatý	
Slovenian		Odmiranje cedrovih poganjkov	Bilardova medvejka	Douglasova medvejka	Japonska medvejka	Polstena medvejka	Bela pamela, bisernik
Spanish	Picoloro de webb				Espirea de japón	Arbusto aguja	
Swedish			Klasespirea	Punapajuangervo	Rosenspirea	Luddspirea	

T → V → W

Page number(s)	126, 127, 128, 129	199	158	110,111	184,185	100,101	98,99
Scientific name	***Symphyotrichum* spp.**	***Tamiasciurus hudsonicus***	***Thekopsora minima***	***Tradescantia fluminensis***	***Vespa velutina***	***Vitis vulpina***	***Wisteria sinensis***
English	North american asters	American red squirrel	Blueberry leaf rust	Small-leaf spiderwort	Asian hornet	Frost vine, frost grape	Chinese wisteria
Bosnian					Azijski stršljen	Američka loza	
Bulgarian							
Catalan	Setembres, setembrines	Esquirol vermell americà		Tradescàntia, fulla d'ombra	Vespa asiàtica		Anglesina
Croatian	Zvjezdan			Tradeskancija	Azijski stršljen	Zimsko grožđe, divlje grožđe	
Czech	Astra	Čikarí červený		Podeňka světlá	Sršeň asijská	Réva vlčí	Wistárie čínská
Dutch	Noord-amerikaanse astersoorten	Amerikaanse rode eekhoorn		Vaderplant	Aziatische hoornaar		Chinese blauweregen
Estonian		Ameerika punaorav		Brasiilia tradeskantsia	Aasia vapsik	Rebase-viinapuu	Hiina sinivihm
Finnish							
French		Écureuil roux		Éphémère de rio	Frelon asiatique	Vigne des battures	Glycine de chine
German		Rothörnchen		Rio-dreimasterblume		Winterrebe	
Greek		Αμερικάνικος κόκκινος σκίουρος			Ασιατική σφήκα		
Hebrew		ינקירמא סודא יאנס		דדונ ידוהי	תיתאיסא הערצ		תיניס הירטסיו
Hungarian	Őszirózsa	Kanadai vörösmókus		Pletyka	Ázsiai lódarázs	Parti szőlő	Lilaakác
Italian	Aster	Scoiattolo rosso americano	Ruggine	Tradescanzia sudamericana, erba miseria	Calabrone asiatico	Vite riparia	Glicine cinese, glicine comune
Lithuanian	Astrūnas	Amerikinė raudonoji voverė, raudonoji voverė		Brazilinė tradeskantė	Azijinė vapsva	Lapinis vynmedis	Kininė visterija
Luxembourgish					Asiatesch runn		
Norwegian	Høstasters					Resedavinranke	
Polish	Aster	Sosnowiórka czerwona		Trzykrotka wężykowata	Szerszeń azjatycki	Winorośl zimowa	Glicynia chińska, słodlin chiński, wisteria chińska
Portuguese	Malmequeres			Erva-da-fortuna	Vespa-asiática	Videira-raposa	Glicínea
Romanian		Veverita rosie americana			Viespea asiatica		
Serbian				Љубичаста лозица	Азијски стршљен	Америчка лоза	
Slovak	Astra			Tradeskancia myrtolistá	Sršeň ázijský	Vinič zimný	
Slovenian	Severnoameriške nebine		Rja ameriške borovnice	Tradeskancija	Azijski sršen	Lisičja vinska trta	Kitajska glicinija
Spanish		Ardilla roja americana		Amor de hombre		Vid helada, vid de invierno, vid de zorro	
Swedish				Vandrande jude	Sammetsgeting	Frostvin	

X →

Page number(s)	159	162
Scientific name	***Xylella fastidiosa***	***Xylosandrus crassiusculus***
English	Pierce's disease of grapevines	Asian ambrosia beetle
Bosnian		
Bulgarian		
Catalan	Xilel·la	
Croatian	Brzo sušenje masline	
Czech		
Dutch		Aziatische ambrosia-kever
Estonian		
Finnish		
French		
German		
Greek		
Hebrew		
Hungarian	A szőlő pierce-féle betegsége	Szemölcsös szú
Italian	Xilella	Scarabeo ambrosia asiatico
Lithuanian		
Luxembourgish		
Norwegian		
Polish		
Portuguese		
Romanian		
Serbian		
Slovak		
Slovenian		Azijski ambrozijski podlubnik
Spanish		
Swedish		