Field Guide *to* Invasive Plants & Animals in Britain

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BLOOMSBURY

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Introduction

Invasive non-native species represent one of the greatest threats to biodiversity worldwide. However, despite increasing awareness of environmental issues, people remain largely unaware of these plants and animals and their potentially devastating impacts. Although most biological introductions fail, those species that successfully establish in a new region can have far-reaching and in some cases disastrous impacts on native fauna and flora, economic interests and can even affect human health and society.

This field guide will assist in the identification of a range of invasive non-native species found in Great Britain, as well as a number that are not yet present or considered invasive but could soon become so (known as horizon-scanning species). Although these species are of particular concern to conservationists, this guide should also be of interest to the amateur naturalist and an important tool for ecologists and land managers attempting to tackle the problems posed by invasive non-native species.

Invasive non-native species impact on rare native species in Britain. In this case Himalayan Balsam *Impatiens glandulifera* is out-competing the native Tansy plant *Tanacetum vulgare*, which supports the last population of the endangered Tansy Beetle *Chrysolina graminis* in Britain.

A non-native species is one that has been transported from its native range to a new region with the assistance of humans. The introduction of non-native species has led to dramatic changes in the composition of Britain's flora and fauna. There are now almost as many non-native plant species established in Britain as there are native, and significant proportions of established non-native mammal, reptile, amphibian and fish species. The proportion is much lower for birds and invertebrates. The majority of non-native species are found in terrestrial habitats, with smaller numbers in freshwater and marine habitats.

> **Non-native species** – a species that has been transported from its native range to a new region with the assistance of humans.

The majority of established non-native species in the wild in Britain are benign, having no or negligible impact. However, a significant minority cause harm – it is these that are termed invasive non-native species.

> **Invasive non-native species** – a non-native species that has a negative environmental, economic or societal impact.

About 10–15% of the established non-native species in Britain have a negative impact, although this proportion varies between different groups of species. For example, about 8% of established non-native plants become invasive, while the same figure for animals is much higher, about 40%. Certain habitats are more vulnerable to invasion than others. Small islands are particularly vulnerable, as are freshwaters where about 40% of all established non-native species have a negative impact.

Invasive non-native species can have particularly severe impacts on islands, for example this American Mink *Neovison vison* attacking the chick of a Gannet *Morus bassanus*, classified as a vulnerable species by the IUCN.

The consequences of invasive non-native species becoming established can be as severe as wholescale ecosystem change, the loss of ecosystem function and the decline of native species, including rare and protected species. Such consequences have been likened to a form of 'biological pollution', but worse than chemical pollution as they rapidly spread beyond the initial point of introduction and persist well after the source of the introduction has been removed.

The invasive non-native Water Fern *Azolla filiculoides* smothering a water body.

Grey Squirrels *Sciurus carolinensis* have displaced native Red Squirrels *Sciurus vulgaris* throughout most of their range in England and Wales. This Red Squirrel is suffering from squirrel pox, a disease introduced with and spread by the Grey Squirrel.

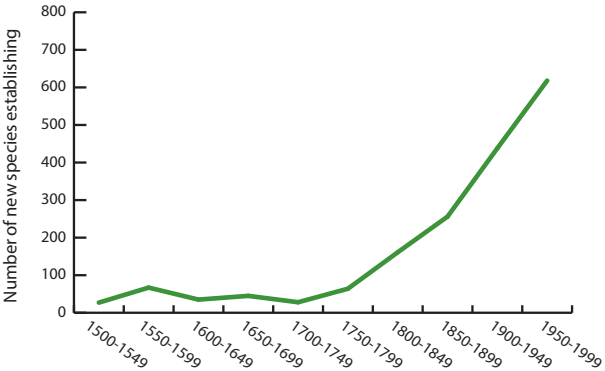
American Skunk-cabbage *Lysichiton americanus* in the New Forest, smothering important wet woodland habitat and displacing important native species.

In addition to environmental damage, invasive non-native species have a wide range of other effects. They cost the British economy at least £1.7 billion per annum in damage and control. Other impacts experienced frequently include human health impacts, increased risk of flooding, reduced value of recreational land, and nuisance and damage to construction and infrastructure.

Japanese Knotweed *Fallopia japonica* growing up through tarmac – this is just one of the invasive non-native species that causes significant economic impacts, estimated to cost £165 million each year in damage and control costs.

Asian Hornet (*Vespa velutina*) 'hawking' outside a honey bee colony. Asian Hornets invaded France in 2004 and now cause approximately 1 death per year as a result of anaphylaxis following stings; while not yet present in Britain they are likely to arrive soon.

The introduction and establishment of non-native species is not a new phenomenon, but it has been increasing rapidly as trade, transport and travel continue to increase. In the past 200 years Britain has seen a seven-fold increase in the number of non-native species established, from 260 in 1800 to almost 2,000 at the time of publication. Introductions have reached unprecedented levels, with on average ten new non-native species establishing in Britain every year, and this trend is set to increase.



The number of new non-native species establishing in Britain has been rapidly increasing over the past 200 years (Roy *et al.* 2012).

How can we reduce the impact of invasive non-native species? Once established and widespread, invasive non-native species are difficult and costly to manage. For example, it has been estimated that to eradicate Japanese Knotweed in Britain would cost over £1 billion and so implementing such an eradication attempt is impractical and unfeasible.

The agreed strategy (Defra 2008) is therefore to:

- Prevent invasive non-native species from becoming established in the first place – 'prevention is better than cure'.
- Rapidly detect those species that do establish and, if they pose a significant threat, eradicate them where feasible.
- If the species does become well established and widespread, seek opportunities to reduce and mitigate its impacts.

Users of this guide can support this approach by recording and reporting non-native species that they encounter in the wild in Britain. In particular those species marked with the '!' symbol should be reported as soon as possible if found in the wild. Page 14 provides more guidance on how and where to report records.

Scope

The geographical coverage of this guide is Britain: that is England, Scotland and Wales. Invasive non-native species found in terrestrial and freshwater habitats are included, but not marine species. We have included, with certain exceptions, the majority of established invasive non-native species from these environments, as well as a number that are not yet established but could become invasive in the future, so called horizon-scanning species. In determining which species to include, the authors consulted various existing lists (see References, page 286) as well as a range of experts in the field.

For practical reasons, we have not been able to include:

- most agricultural and horticultural pests and diseases (although some insects are included where they may have wider environmental impacts)
- animals and plants for which reliable identification requires a microscope, e.g. planktonic crustaceans and blue-green algae
- plants and animals native in one part of Britain which have been introduced to other parts
- non-native plants that were introduced and established in Britain in 'ancient' times, usually regarded as prior to 1500 AD.
- While the impact of some species is clear and well-studied, the impact of other species is less clear (if there is an impact at all). Although we have made every effort to include as many relevant species in this guide as possible, it should not be considered a definitive list of invasive non-native species in Britain.

How to use this field guide

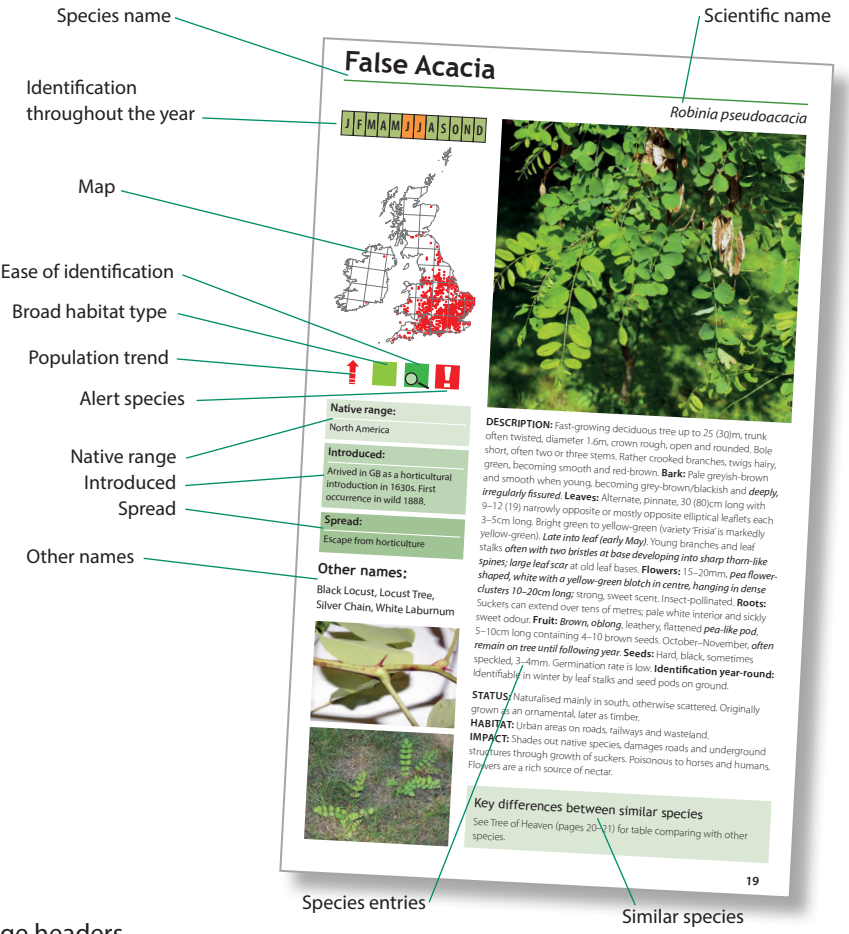
General

The first half of this guide deals with plants, which are ordered according to growth habit, for example: trees, shrubs, climbers and creepers, herbs, grasses and bamboos, mosses and liverworts and aquatic plants. The second half deals with animals, which are ordered according to their major taxonomic grouping: mammals, birds, amphibians, reptiles, fish, freshwater invertebrates and terrestrial invertebrates. Introductory pages for each section help to provide background information and identification guidance for the group of species that follows.

A glossary is provided to help clarify technical words (page 282). A large range of references has been used to help compile the information in this guide. It was not practical to cite these directly in the text, but a full list of references is provided (page 286).

Species accounts

An account for a single species is usually given using the following structure:



Page headers

The recognised English or common name.
The recognised scientific name.

Identification throughout the year

For plants green = plant is able to be identified; orange = plant is in flower; blank = identification difficult or impossible. For animals orange = optimal time to identify the species; green = suboptimal time for identification; blank = identification difficult or impossible.

Maps

A distribution map for the species. Maps comprise: solid red dots = species recorded; open dots = species recorded, but no longer present; X = species recorded in this location, but subsequently eradicated. For mammals red = main areas of establishment and grey dots = species may be present (the remaining symbols are the same as for other species). Where a species has not been recorded in Britain this is stated in words across the map. How thorough the recording has been will vary from both species to species and from one region to another.

Population trend

 population decreasing

 population neither increasing nor decreasing

 population increasing

 population increasing rapidly

 population eradicated

NP no population present

Broad habitat type

Indicating whether the species is:

 terrestrial

 partly terrestrial and partly aquatic

 aquatic

Ease of identification

An estimation of how difficult the species is to identify and distinguish from similar species likely to be encountered.

 easy

 moderately difficult

 difficult

Alert species

 It is particularly important to be on the look-out for, and to report, some species. We have indicated these species with a '!' symbol.

Native range

Indicates where the species is native.

Introduced

Indicates the year and in some cases the method of introduction to Britain. For plants the year of first arrival and year first found in the wild is usually given. For animals, the year of establishment in the wild is given unless otherwise stated.

Spread

Indicates how the species is currently spread by humans. Note that methods of natural spread are not included here but may be covered in the text.

Other names

Gives names that might be used for the species, both common and scientific names.

Species entries

Entries are provided for each species based on the species as it is found in the wild in Britain and follow the format of: description (incorporating different elements for different plants and animals); status, habitat and impact. Where information is used for species in cultivation or captivity or from another country, this is specified.

The most important identification features of the species are emphasised in ***bold italic***. The most common measurements of the species are provided, with the maximum and/or minimum size recorded in brackets, e.g. 5–9 (12)cm long.

Similar species

If species of similar appearance might be encountered in Britain, guidance is provided on how to distinguish them from each other. Similar species may be native or non-native and sometimes other invasive non-native species (in which case cross reference with other relevant pages in the guide is provided). Where relevant, further advice on identifying a given species or group of species is provided. These can be found in the reference(s) (page 286) to which attention is drawn.

Recording invasive non-native species

Useful biological records can be provided by anyone, from amateur naturalists and environmental professionals to members of the general public.

As a minimum you should always record:

- Your name and contact details (if submitting the record to a database)
- The name of the species
- The date of the record
- The location of the record (usually a six-figure grid reference or GPS location)
- A photograph or voucher specimen if possible

When you submit a record, it is useful to check whether the scheme or system you are reporting through shares your data with the National Biodiversity Network (NBN) Gateway. This way you can be confident that your record will contribute to mapping the national distribution of the species as well as supporting action where required.

There are a number of different ways to submit biological records:

- **Online**. Where possible online records should be submitted through the iRecord website. This has been developed by the national Biological Records Centre as a tool for all biological data to be simply and quickly entered into the NBN Gateway.
- **Using a dedicated phone application** (app). There are a growing number of mobile phone apps dedicated to recording invasive species. These have the advantage of automatically recording your location and quickly allowing you to upload a photo. Again, make sure the app you use submits its data to the NBN Gateway, this should be made clear in the information that comes with the app.
- **By email or post**. Although less immediate and less reliable, you can email or send paper records to the Biological Records Centre at: Biological Records Centre, CEH Wallingford, Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire OX10 8BB, England, or to your local records centre, details for which can be found by searching the internet for "county name" and "environmental records centre".
- More information about recording and links to relevant websites and phone applications can be found here: www.nonnativespecies.org/recording.

Biosecurity

Many invasive non-native species are easily spread as seeds, larvae and eggs, for example in mud, water or vegetation attached to boots, clothing and equipment. It is important to use good biosecurity practice when in the field to reduce the risk that you might accidentally spread something.

Biosecurity is usually common sense. Points to remember include:

- When walking, stay on footpaths, be aware of signage that may be alerting you to particular risks and clean your footwear and clothing before moving between sites. It is often easier to keep a clean spare pair of boots in the car to change into if you are moving onto another site.
- Keep a stiff brush and some water in your car to clean your boots with at the end of the day or between trips.
- Aquatic invasive species and diseases are particularly easy to transmit. If you are accessing water make sure to check, clean and dry your boots, clothing and equipment before using it elsewhere (ideally washing in hot water and then keeping equipment dry for 48 hours which will help to sterilise it).
- Disinfectants are often used to reduce the risk of spreading diseases, particularly those of fish, livestock, amphibians and trees. Make sure to follow any disinfection instructions provided by the landowner.

Invasive non-native species and the law

The law relating to invasive non-native species is different in England, Scotland and Wales. We do not provide detail here, but in general the various laws relate to:

- Importing, transporting, keeping and selling certain species
- Releasing or allowing the escape of non-native species
- Managing and disposing of non-native species

Those simply observing non-native species in the wild are unlikely to have any specific legal duties. However, you should remember never to introduce or spread invasive non-native species, either accidentally or deliberately. Some surveys could result in the capture of live non-native animals, in which case it may be an offence to subsequently release them. If in doubt you should check with the relevant authorities before undertaking such work.

It is possible to confuse some invasive non-native species with legally protected native species, for example the protected native White-clawed Crayfish with the invasive non-native Signal Crayfish. Some survey techniques could also damage or disturb native habitats and species. You should always be mindful of the potential impact on native species and habitats and if in doubt consult the relevant authorities.

This limited account of non-native legislation is not a replacement for assessing your own legal responsibilities, which you should always check. The legal framework for non-native species is regularly updated. Up-to-date information can be found at the Non-Native Species Secretariat website (www.nonnativespecies.org).

Plants introduction

There are more than 1,400 non-native species established in Britain, such that there are almost as many established non-native species as there are native. However only a small proportion of these non-native species have gone on to become invasive.

The invasive non-native plant species found in Britain come from across the plant kingdom: including mosses, liverworts, ferns, grasses, herbs and trees. The proportions however vary, for example, there are many grasses in Britain but only a few are non-native and invasive whereas almost all the balsam species are invasive and non-native. Invasive non-native plants can be encountered in all habitats from woodlands and coastal habitats to rivers, lakes and ponds. Not surprisingly many invasive non-native plant species are found in urban habitats. In contrast, these plants are noticeably infrequent in some other habitats such as grasslands.

Many of the plant species described in this field guide are characteristic and especially when in leaf and in flower are easy to see and relatively easy to identify. In some cases, there are similar species, usually in the same genus, and/or hybrids which make identification more difficult. The field guide draws attention to these other species, both native and non-native, and provides guidance on how to distinguish between them. In some cases there are similar species and hybrids that have either been seen in the wild only on a few occasions, typically escapes from cultivation, or might be expected to spread outside of cultivation. Whilst some such plants have been included in the field guide, space has limited their inclusion.

Most of the plants described in this field guide originated in gardens as ornamental species from where they have moved into other habitats, mostly with human assistance though sometimes naturally, for example spread by the wind or birds. These origins mean that the plants can be variable in their characteristics and can be known by a number of names. The descriptions of the plants which follow come from a range of sources, all of which are listed in the References section at the end of the book (page 286).

Swathes of Virginia Creeper *Parthenocissus quinquifolia*, festooning an old house are very characterful, but these plants can quickly overwhelm native trees and bushes if allowed to get out of control.

Red Valerian *Centranthus ruber* is able to colonise a wide range of habitats including old walls and bridges. It can displace native species and reduce nesting opportunities for birds in coastal dunes, shingle and on limestone pavements.

The majority of entries in the field guide are for specific species, for example Tree of Heaven or Water Fern. In some cases it is more efficient to deal with a group of species (or genus) such as the Honeysuckle shrubs and the cotoneasters. In these instances, the photograph(s), distribution map and other information in the left hand margin refer to a particular named species from the genus.

The Description section follows a similar pattern for all the species (or group of species), providing key aspects of the plant's habit (size, perennial, biennial etc.) and nature of plant (tree, shrub, creeper etc.) followed by an account of the leaves, flowers including how pollinated, fruits and in some cases seeds, roots and rhizomes. For trees and shrubs the bark is described. A guide is given to identification year-round and the remainder of the entry follows the format: Status (including how the plant spreads), Habitat and Impact.

Trees

A large number of non-native tree species have been planted in Great Britain in gardens and parks, for example as part of landscaping schemes and as forestry crops. A minority of these tree species have become established outside the area in which they were planted and some have become invasive. This field guide describes 11 such non-native tree species (pages 19–33) which are causing problems in some habitats. Reference is made to other species, similar to those described in detail, a number of which are also non-native.

Trees have a number of useful characteristics to help in their identification. These include the shape of the tree itself, and parts of the tree including material shed from the tree such as flowers, leaves and fruits. With practice it is possible to identify trees at any time of the year, even after they have shed their leaves.

Leaves The shape can range from simple, a single leaf as in a needle (Lodgepole Pine) or in Grey Alder, to a compound leaf where a single leaf is made up of several leaflets which can be arranged along a central axis (pinnate, as in False Acacia) or radiate from a single point (palmate, as in Horse Chestnut). Leaves on a stem can be opposite (Tree of Heaven), alternate (Evergreen Oak) or appear to spiral around the end of the stem. Leaves can be untoothed with a straight edge, have serrated edges (cherries) or distinctive lobes (most oaks). For deciduous trees, there are other identification features during the winter on, e.g. twigs and leaf scars, and beneath the tree, e.g. leaf stalks and fruits.

Height Tree height in this field guide is the maximum height normally attained. Many will be smaller due to age and/or growth conditions, for example exposure or soils.

Crown, trunk and branching pattern Trees can have straight column-like trunks, be taller than wide, or broader with a shorter trunk. Branches can be relatively straight as in Turkey Oak, or twisted like Pedunculate/English Oak.

Bark Colour and texture of bark can be useful though texture usually becomes rougher and tends to crack and fissure with age. Note whether the bark strips or flakes to reveal brighter layers beneath.

Flowers The Tree of Heaven and False Acacia have showy and obvious flowers but many trees have insignificant flowers that are green-yellow in colour and not easy to see but still useful for identification.

Fruits Valuable later in the season, especially once the leaves of deciduous species fall. Fruits can vary from berries and pods to acorns and cones. Remember that the fruit is only borne on trees with hermaphrodite flowers or female flowers. In the latter case, the males of the species will not bear fruit.

Tree of Heaven *Ailanthus altissima* can quickly form thickets in a range of urban habitats and tolerates both pollution and poor soil. The roots can cause damage to buildings and others structures including pavements and drains.

False Acacia

Robinia pseudoacacia

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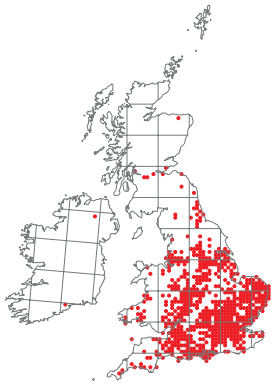

Native range:

North America

Introduced:

Arrived in GB as a horticultural introduction in 1630s. First occurrence in wild 1888.

Spread:

Escape from horticulture

Other names:

Black Locust, Locust Tree, Silver Chain, White Laburnum

DESCRIPTION: Fast-growing deciduous tree up to 25 (30)m, trunk often twisted, diameter 1.6m, crown rough, open and rounded. Bole short, often two or three stems. Rather crooked branches, twigs hairy, green, becoming smooth and red-brown. **Bark:** Pale greyish-brown and smooth when young, becoming grey-brown/blackish and ***deeply, irregularly fissured***. **Leaves:** Alternate, pinnate, 30 (80)cm long with 9–12 (19) narrowly opposite or mostly opposite elliptical leaflets each 3–5cm long. Bright green to yellow-green (variety 'Frisia' is markedly yellow-green). ***Late into leaf (early May)***. Young branches and leaf stalks ***often with two bristles at base developing into sharp thorn-like spines; large leaf scar*** at old leaf bases. **Flowers:** 15–20mm, ***pea flower-shaped, white with a yellow-green blotch in centre, hanging in dense clusters 10–20cm long;*** strong, sweet scent. Insect-pollinated. **Roots:** Suckers can extend over tens of metres; pale white interior and sickly sweet odour. **Fruit:** ***Brown, oblong***, leathery, flattened ***pea-like pod***, 5–10cm long containing 4–10 brown seeds. October–November, ***often remain on tree until following year***. **Seeds:** Hard, black, sometimes speckled, 3–4mm. Germination rate is low. **Identification year-round:** Identifiable in winter by leaf stalks and seed pods on ground.

STATUS: Naturalised mainly in south, otherwise scattered. Originally grown as an ornamental, later as timber.
HABITAT: Urban areas on roads, railways and wasteland.
IMPACT: Shades out native species, damages roads and underground structures through growth of suckers. Poisonous to horses and humans. Flowers are a rich source of nectar.

Key differences between similar species

See Tree of Heaven (pages 20–21) for table comparing with other species.

Tree of Heaven

Ailanthus altissima

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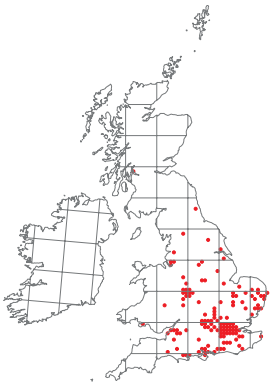


Native range:

East Asia

Introduced:

Arrival in GB as a horticultural introduction in 1751. First occurrence in wild 1935.

Spread:

Escape from horticulture

Other names:

Chinese Tree of Heaven, Stinking Sumac

DESCRIPTION: Rapidly growing small to medium-sized deciduous tree, 20 (25)m tall, with stout twisting wide-spreading branches from a short straight trunk, diameter 0.9m. Crown typically a straight cylindrical bole, then stout, strongly ascending branches bearing a tall, irregular dome. Twigs coarse, hairy, yellow-green becoming smooth, reddish-brown. **Bark:** Smooth, grey-brown, sometimes ***chequered*** with ***pale vertical stripes*** as it matures, becoming broken into diamond-shaped spaces. Bitter if tasted. **Leaves:** ***Alternate, pinnate***, 30–60 (80 or more on new growth)cm long with 5–12 pairs leaflets, 10–17cm long, opposite or mostly opposite, unpleasant smell. Glossy, underside lightly downy at first. ***1 to 6 large teeth*** towards the base of each leaflet. **Flowers:** Small, 7–8mm ***in cream or green-white plumes up to 25cm long***. Male and female flowers on different trees. ***Sometimes unpleasant and acrid scent***, worse in male flowers. Insect-pollinated. **Roots:** Horizontal, becoming substantial. **Fruit:** One-seeded, 3–4cm long and 1cm wide, densely clustered in bunches of 1–5, like ash 'keys', each seed centrally located within a papery wing; given warm weather, ripening to bright orange or scarlet in late summer fading to reddish-brown becoming pale brown. **Seeds:** Round, 1cm diameter, compressed. Can be more than 300,000 seeds per tree. **Identification year-round:** Identifiable in winter by distinctive bark, large leaf scars on its twigs, and remains of leaf stalks and papery-winged fruits on ground or on tree.

STATUS: South-east England, especially in Greater London and East Anglia. Ornamental, grows rapidly, suckering freely, sometimes establishing by seeds. Suckers extensive, reaching up to 15m from parent tree. Resprouts vigorously from cut stumps and root fragments. **HABITAT:** Mainly restricted to the urban environment where planted widely and tolerant of pollution, aridity and poor soil. **IMPACT:** Forms thickets inhibiting ground flora both by shading and through production of a toxic chemical that suppresses germination and growth of other plant species. Roots and suckers can disrupt structures, pavements, drains and buildings.

Key differences between similar species

Possible to be confused with other deciduous trees that have pinnate leaves. For False Acacia see page 19.

	Leaf			Flower		Fruit/pod shape	Bark
	Leaflets	Serrated edges	Alternate	Shape	Colour		
Tree of Heaven ***Ailanthus altissima*** **(non-native)**	Pinnate, 5–12 pairs opposite or mostly opposite leaflets	Partially (teeth at base of leaflet)	Yes	Plume-like cluster of very small flowers	Cream	Winged fruit with central seed	Smooth, grey-brown, sometimes with vertical stripes
False Acacia ***Robinia pseudoacacia*** **(non-native)**	Pinnate, 9–12 pairs opposite or mostly opposite leaflets	No	Yes	Pea-like flower	White	Pea-like seedpod	Pale greyish-brown becoming fissured
European Ash ***Fraxinus excelsior*** **(native)**	Pinnate, 4–6 pairs opposite leaflets	Yes	No	Dense cluster of tiny flowers	Purple	Winged fruit in 'keys'	Smooth, grey
Elder ***Sambucus nigra*** **(native)**	Pinnate, 2–7 pairs opposite leaflets	Yes	No	Umbel of small flowers	Creamy-white	Cluster of black berries	Fissured, creamy-brown
Stag's-horn Sumach ***Rhus typhina*** **(non-native)**	Pinnate, 5–7 pairs opposite leaflets	Yes	Yes	Dense furry 'cone'	Crimson	Dense furry fruiting 'cone'	Grey-brown
Walnut ***Juglans regia*** **(non-native)**	Pinnate, 2–4 pairs of large opposite leaflets	No	Yes	Catkins	Yellow-green	Large round green fruit	Pale grey, smooth at first becoming fissured
Rowan ***Sorbus aucuparia*** **(native)**	Pinnate, 5–7 pairs opposite leaflets	Yes	Yes	Cluster of small flowers	White	Cluster of red berries	Smooth, grey
Laburnum ***Laburnum anagyroides*** **(non-native)**	Three leaflets	No	Yes	Pea-like flower	Yellow	Pea-like seedpod	Smooth pale greenish-brown

Tree of Heaven
Ailanthus altissima

False Acacia
Robinia pseudoacacia

European Ash
Fraxinus excelsior

Elder
Sambucus nigra

Stag's-horn Sumach
Rhus typhina

Walnut
Juglans regia

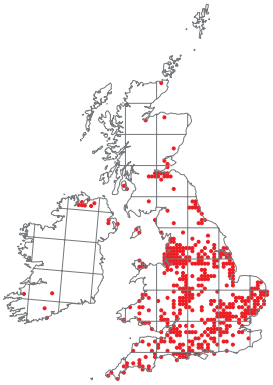
Rowan
Sorbus aucuparia

Laburnum
Laburnum anagyroides

Italian Alder

Alnus cordata

J F M A M J J A S O N D



Native range:
S Italy, Corsica and Albania

Introduced:
1935 (1820)

Spread:
Escape from horticulture

Other names:

Speckled Alder

DESCRIPTION: Vigorously growing deciduous tree up to 28m, diameter 3m with ***conical-pyramidal relatively dense crown*** up to 7m wide. **Bark:** Pale ***grey-brown*** aging to grey, ***smooth with blisters*** and few vertical, shallow, wide fissures. Twigs dark brown, angled when young with grey bloom. Buds pale green, speckled red-brown. **Leaves:** ***Dark glossy, pear-like***, paler beneath; hairless except for ***large tufts of pale orange hairs under vein joints*** (use hand lens); with a very long season in leaf, (April to November), falling grey-green. ***Heart-shaped, regularly crenate toothed*** with 40–55 teeth either side, (4)5–8(12)cm long, 5–7cm wide, leaves flutter on long leaf stalks, 2–3cm long. Rolled when young, new leaves in summer often tinged orange. **Flowers and fruit:** Male and female catkins found on the same plant. Male flowers 0.5cm long grouped in fawn-yellow, showy pendulous ***catkins of up to 10cm***. Reddish female flowers, 1cm long, grouped in 1-3 short erect catkins developing into 1–2(3) ***relatively large*** green 'cones' maturing in the autumn to a dark-reddish brown, 1.5–3cm long and remaining on the tree for about 2 years. Wind pollinated. **Seeds:** Numerous, small and winged. Wind dispersed. **Roots:** Deep rooted, developing nitrogen fixing nodules. **Identification year-round:** Distinctive crown and bark and large cones enable identification throughout year.

STATUS: Found over much of Britain but less so in Scotland.
HABITAT: Increasingly planted as an ornamental tree in parks and along streets and in shelter belts. Unlike other alders, thrives on poor, dry soils, including over chalk.
IMPACT: Unknown.

Key differences between similar species

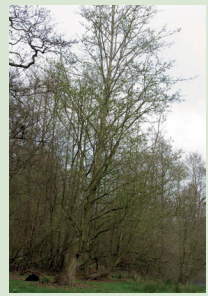
Can be confused with other alder species.

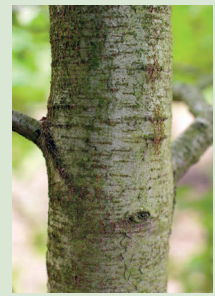
	Italian Alder *Alnus cordata* (non-native) CS&T	**Grey Alder** *Alnus incana* (non-native)	**Alder** *Alnus glutinosa* (native)	**Red Alder** *Alnus rubra* (non-native)
Leaf shape	***Heart-shaped at base, regularly crenate-toothed, rolled when young. Tufts of orange hairs on veins on underside (use hand lens)***	***Small lobes, subacuminate to subacute at tip, coarsely toothed; not sticky when young, wedge-shaped to rounded at base; edges of leaves flat (not rolled), distinctly paler on underside; 9–12 pairs of lateral veins***	***Broadly obtuse with shallow blunt notch at tip, wedge-shaped at base; sticky when young; not or scarcely pale on underside, 4–8 pairs of lateral veins***	***Pronounced small lobes, subacuminate to subacute at tip, not sticky when young; distinctly paler on underside; 7–15 pairs of lateral veins. Edges of leaves narrowly but strongly rolled under***
Female catkins	***In clusters of 1–3, with short stalk on a common stalk. Much larger than Alder***	In clusters of 3–8, ***stalkless*** or with short stalk ***on a common stalk***	In clusters of 3–8, ***with short stalk on a common stalk***	***In clusters of 3–6, stalked***
Twigs	Dark brown, angled when young	***Ends of last year's twigs with short hairs, weakly angled when young***	Smooth and ridged when young	***Often conspicuously reddish, ends of last year's twigs smooth***

Alder
Alnus glutinosa

Red Alder
Alnus rubra

Grey Alder
Alnus incana





Rum Cherry

Prunus serotina

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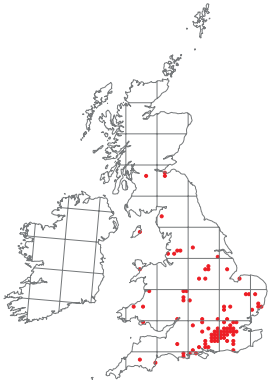

Native range:

Eastern North America

Introduced:

Arrived in GB as a horticultural introduction in 1629. First occurrence in wild 1853.

Spread:

Escape from horticulture

Other names:

Black Cherry, Wild or Mountain Black Cherry, American Cherry, Whisky Cherry

DESCRIPTION: A small or medium-sized deciduous tree, 15–23 (30)m, stout trunk, diameter 0.7–1.2m, with little tapering, often slightly bent with few lower branches, upper branches spreading with open round crown. Scratching a young twig produces a foetid almond-like scent. **Bark:** Dark reddish-brown to black, initially thin and striped with horizontal lines, with age (>10 years) developing ***large conspicuous peeling strips*** (like burnt potato crisps), green inner bark tastes bitter and smells aromatic. **Leaves:** Simple, lance-shaped, alternate, 5–15cm long, 2.5–4.5cm wide, shiny dark green above and paler and slightly downy below; resembling a bird's beak; fine-toothed margin with forward-projecting teeth, ***row of fine brown hairs along underneath of midrib***. Leaf stalk 0.7–2.5cm long with glands near to leaf blade. **Flowers:** Creamy-white flowers up to 1cm wide, usually 10 or more in elongated closely packed clusters, 10–15cm long on relatively rigid hairless or sparsely hairy stalk 0.3–1.2cm long. ***Petals 3–5mm long*** with small teeth at margins. **Fruit:** Green-red cherry, spherical but slightly flattened, becoming purplish-black on ripening, 0.6–1cm wide, borne in clusters. Sepals remain until fruit is ripe. Edible but bitter. **Seeds:** A spherical stone, smooth. **Identification year-round:** Leaves turn yellow in autumn. Bark characteristic in older trees.

STATUS: Found in southern England although known from further north and in Wales. Spreading steadily. Berries readily eaten by birds (no suckering).
HABITAT: Commonly planted in gardens. Naturalised in woodland, hedgerows, roadside verges, riversides and heaths.
IMPACT: Dense patches can displace native species.

Key differences between similar species

Bird Cherry *Prunus padus*

Native (non-native in some parts of Britain). Shiny bark. Heavily scented blooms, spike-like in elongated, closely packed, drooping clusters of 10–40 flowers. Large petals (6–9mm) and sepals fall off before the fruit is ripe. Leaves smooth or with white hairs in tufts along lower side of midrib, turning a rich red in autumn. Stones pointed, oval, 6mm long, 4mm wide with a rough wrinkled surface.

Rum Cherry and Bird Cherry are distinguished from other cherries by their flowers in groups of more than ten on elongate spikes, and young twigs which have strongly odorous inner bark when scratched (Rum Cherry smells foetid) and the absence of suckering. See also Cherry Laurel (page 50) and Portuguese Laurel (page 51): both evergreen with tough and leathery leaves.

Rum Cherry
Prunus serotina

Bird Cherry
Prunus padus

Turkey Oak

Quercus cerris

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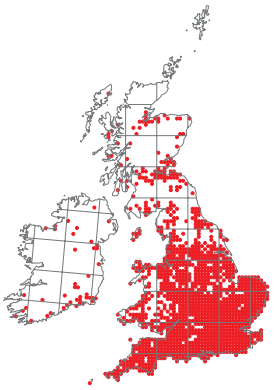

Native range:

South central Europe to south-eastern Asia

Introduced:

1905 (1735)

Spread:

Escape from horticulture

Other names:

Wainscot Oak, Mossy-cup Oak

DESCRIPTION: Deciduous tree up to 35 (40)m tall, diameter 2.6m. Straight trunk, crown open, slender and conical in young trees becoming broadly domed; usually tall with long, ascending branches swollen at base. **Bark:** Pale mauve-grey to dark grey-brown, thick, rough (rougher than Pedunculate Oak (native)), with wedge shaped fissures deep within which are streaks of bright tangerine orange. **Leaves:** (6) 9–12cm long, dark green, alternate, leathery, slender and variable often with 4–9 simple pointed/rounded lobes sometimes cut to midrib on each side of leaf. Leaf stalk up to 2cm. Rough on both surfaces, often felt-like and somewhat sticky beneath. ***Thread-like stipules remain until following season. Leaf buds with distinctive whiskers.*** **Flowers:** Male and female flowers borne separately on same tree. Males in axils of new leaves, obovoid 5mm, crimson before opening, brownish-golden yellow, drooping catkins (3) 5–6 (7)cm in long dense bunches, often hanging dead for months. 1–3 inconspicuous female flowers, dark red stigmas surrounded by pale yellow-pink slender scales. Wind-pollinated. **Roots:** Shallowly rooted. **Fruit and seeds:** Small stalkless or short stalked acorns, 15–20 (30)mm long in clusters of 1–4. Acorn cup covered in long slender scales or whiskers and enclosing up to half of the acorn. **Identification year-round:** Can be identified year round by thread-like stipules and acorn cups in winter and in young trees brown faded leaves retained on branches through winter until spring. Acorns ripen in autumn of second year.

STATUS: Frequent in southern England and increasingly so in central and northern England and Wales. Dramatic increase since early 1960s. Self-seeds freely. Grey Squirrel (non-native) implicated in the dispersal of acorns.

HABITAT: Often naturalised on free-draining acid sandy soils. Planted in urban parks, estates, large gardens, and by roadsides spreading to woodland fringes, woodlands, dry grassland and heathland, railway embankments and waste ground.

IMPACT: Encroaches onto open grassland and heathland and displaces native species. Its associated Knopper Gall Wasp (*Andricus quercus-calicis*) affects the acorns of the native Pedunculate Oak (native) which may be more of a threat than the tree itself.

Red Oak

Quercus rubra

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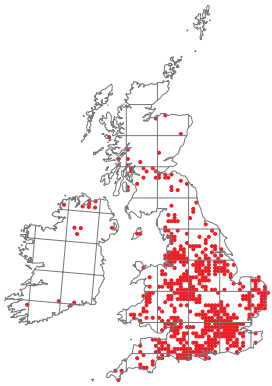

Native range:
Eastern North America

Introduced:
1942 (1724)

Spread:
Escape from horticulture

Other names:

Quercus borealis, Quercus maxima

DESCRIPTION: Fast growing large deciduous tree up to 20 (30)m, diameter 1.8m, ***straight trunk and straight branches***; crown conical becoming broader and rounder with age. Twigs shining, stout, at first green becoming reddish and finally dark brown. **Bark:** Silver-grey and smooth, forming furrows with age. **Leaves:** *Large* up to 20 (25)cm long, thin, sharply angled, ovate to obovate, alternate leaves, matt dark green and smooth above, paler below, orange to scarlet in autumn; ***variable often with 4–6 slender irregularly toothed lobes*** on each side dividing the leaf about halfway to the midrib, each with 1–3 large whisker-tipped teeth ending in a bristle-like point; wedge shaped or rounded at base. Leaf stalk 2–5cm long. Leaf buds with slightly hairy tips. **Flowers:** Male and female flowers borne separately on same tree. Males yellow-green, long slender drooping catkins, 5–8cm. Females dark red, small and inconspicuous solitary or in pairs originating in axils of leaves on new shoots, stalkless or very short stalked (5mm). Wind-pollinated. **Fruit and seeds:** Reddish-brown acorn up to 2.5 (3)cm. Squat acorns, flat based and ovoid, base recessed in centre, solitary or in pairs becoming dark red-brown. ***Cup very shallow, 1.5 – 1.8(2.5)cm wide, curving in at rim with patterned oval tightly fitting scales, finely downy, covering less than a third of the acorn on stout stalk 1cm long.*** **Identification year-round:** Acorns only reach pea size in first year, ripening in September to October of second year. Deciduous, leaves turn deep red in autumn, whiskered buds in winter. Acorns present on tree or on ground.

STATUS: Naturalised in a few places throughout England and Wales. Frequently self-sown but also spreads by suckering and regeneration from cut stools. Grey Squirrels (non-native) have been implicated in the dispersal of acorns.

HABITAT: Widely planted as an ornamental tree in parks, estates, gardens and roadsides, and occasionally for forestry, hedging and screening especially on shallow sandy soils.

IMPACT: Encroaches into open grassland and displaces native species.

Evergreen Oak

Quercus ilex

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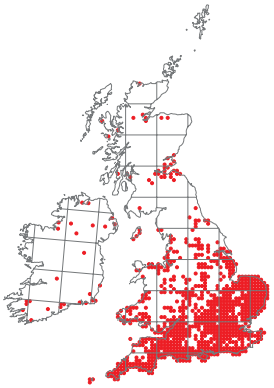

Native range:
Eastern North America

Introduced:
1962 (1724)

Spread:
Escape from horticulture

Other names:

Holm Oak, *Quercus borealis, Quercus maxima*

DESCRIPTION: Evergreen broadleaved tree up to 20 (25)m tall, diameter 1.4m, often bushy with short and sinuous trunk, densely branching. Crown broadly domed. Killed or defoliated by heavy frosts. **Bark**: Grey-black to blackish, rough and finely fissured, cracking in to small squares. **Leaves**: 4–10 (15)cm long, evergreen, alternate, thick, rigid and leathery, very variable shape from oval or elliptical to lanceolate, upper side glossy, bright green, darkening with age, underside white and downy or felt-like. Untoothed or with few small spiny teeth. Young leaves and leaves on lower branches tend to be more toothed with spiny edges, like young Holly. **Flowers**: Male and female catkins borne separately on same tree. Males in dense sprays of drooping catkins, 4–7cm long, pale green, yellow and pink in bud, pale gold against silvery-grey opening leaves and black old leaves in mid-June. Female flowers tiny, in clusters of 2–3, 2mm long on stout woolly flower stalk 1cm long in outer axils, green-grey, pubescent, inconspicuous, tipped pink. April-May. Wind-pollinated. **Fruit and seeds**: Acorns small, light green, short-stalked singly or in pairs, narrowly oval and pointed, up to 1.5–2 (3)cm long. Softly hairy or felted cup, 12mm wide, with scales closely pressed together, enclosing from a third to half of the acorn. September-October. **Identification year-round**: Can be identified year round from leaves. Acorns ripening in first year in September to October.

STATUS: Widely naturalised in southern and central England and Wales especially on Cotswold limestone, and as far north as Cumbria. Spreading in southern and central England and Wales. Seed production can be prolific. Grey Squirrel (non-native) and Jay implicated in the dispersal of acorns, which germinate fairly readily.
HABITAT: Planted in parks, large gardens, churchyards and cemeteries, particularly near the coast. Frequently self-seeded in urban and brownfield sites, chalk grassland, lowland heath, mild coastal woodlands and sand dunes.
IMPACT: Colonising natural habitats aggressively and displacing native vegetation.

Sitka Spruce

Picea sitchensis

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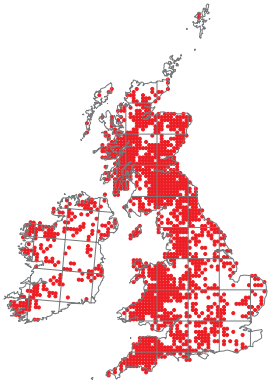


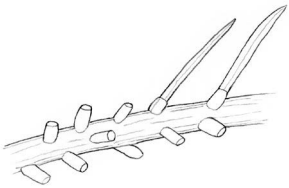
Native range:
Eastern Asia

Introduced:
1957 (arrived in GB 1832)

Spread:
Escape from forestry

Other names:

Coast Spruce



DESCRIPTION: Fast-growing evergreen coniferous tree, up to 55m, crown conical becoming cylindrical with age; trunk stout, diameter 1.1m, occasionally with buttresses. **Bark:** Thin, greyish-brown, becoming darker purplish-grey, looks smooth but feels rough, flaky, breaking away in thin scales, 5–20cm wide. **Leaves:** Needles, ***sharply pointed***, rough to touch, thick and rigid, ***flattened***, woody peg-like stalk, 15–25mm long, ***spread all round twig***, dark or bright bluish or slate-grey green above, with ***two broad whitish stripes on lower side.*** **Flowers:** Male and female flowers borne separately on same plant. Males pale yellow, occurring sporadically as blunt ovoids, shed pollen in May. Females pale red, crowded around the top of some trees. Wind-pollinated. **Fruit:** Hanging, short-stalked, oblong-cyclindrical short cones, blunt at top, ***6–10cm*** long, thin scales with crinkly edge irregularly short-toothed above middle, pale to olive green in summer ripening to cream or pale brown. Scales elongated, rhombic, tapering to squarish with irregularly toothed apex. August to September. **Seeds:** Black, very small, 3mm long, with slender, 7–9mm long pale brown wing. **Identification year-round:** Recognisable from leaves, cones and bark.

STATUS: One of the most important forestry crops in Britain. Self-seeding, wind-dispersed.
HABITAT: Widely planted forestry tree; well adapted to cool wet conditions of uplands, but also planted in lowlands.
IMPACT: Can be invasive in upland heaths and bogs, especially those restored from forestry.

Key differences between similar species

Norway Spruce (or Common Spruce) *Picea abies* (non-native). Large conical conifer (up to 46m in height) commonly used for Christmas trees. In contrast to Sitka Spruce it has pointed branches growing in whorls. Reddish-brown, scaling bark. Mid-green needles ***pointed but less sharply*** than Sitka Spruce, ***four-angled***, 10–25mm long. Shiny brown ***cones hanging, 10–20cm long***.

Lodgepole Pine

Pinus contorta

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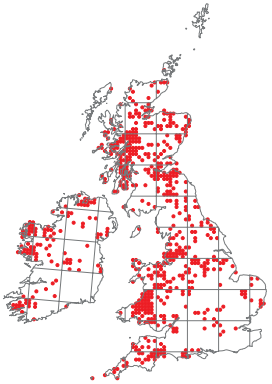


Native range:
Eastern Asia

Introduced:
1968 (arrived in GB 1851)

Spread:
Escape from forestry

Other names:

Beach Pine, Shore Pine, Coast Pine

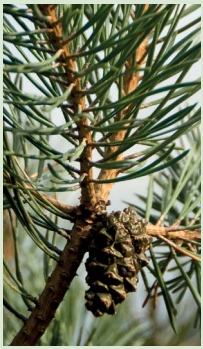
DESCRIPTION: Medium-sized, conical to rounded evergreen conifer 25 (30)m tall, diameter 1–3m, with 8m spread: young trees with broad bushy base and a vigorous central shoot; older trees tall and narrow crowned, densely bushy-domed or spired. A very variable species. **Bark:** Rich brown small square plates divided by fissures (coastal) or brown and scaly (inland) becoming brown above. **Leaves:** Needles 3–8cm long, 1–2mm wide, bright mid-green, ***twisted***, sharply pointed, ***in pairs***. ***Closely clothing long vigorous shoots*** of young trees. **Flowers:** Male and female flowers borne separately on same tree. Males in dense whorl, shed pollen in April. Females dull dark red, 2–4 at or just below tip of shoot. Wind-pollinated. **Fruit:** Pale brown-yellow, shining, cone somewhat egg-shaped, up to 6cm long and 2–3cm wide, each scale with a ***slender fragile sharp prickle*** at tip; in whorls of 2–4 ***pointing back down stem***, sometimes remaining on tree, opening to blunt ovoid. **Seeds:** 4–5mm long, with a wing up to 8mm long. **Identification year-round:** Recognisable from leaves and cones.

STATUS: North and west Britain. Self-seeded, wind-dispersed.
HABITAT: An extensively planted forestry tree adapted to wet conditions and poor soils; invading suitable habitats through self-seeding, particularly heathland and blanket bog, even found on remote cliffs.
IMPACT: Displaces native species in bogs and heathland especially in Scotland and creates management problems in such habitats.

Key differences between similar species

Possible to confuse with other pines with paired needles.

	Lodgepole Pine *Pinus contorta* (non-native)	Scots Pine *Pinus sylvestris* (native)	Austrian or Corsican Pine *Pinus nigra* (non-native)	Maritime Pine *Pinus pinaster* (non-native)	Dwarf Mountain Pine *Pinus mugo* (non-native)
Height	Up to 25 (30)m	Up to 30m	Up to 50m often less	Up to 40m	Up to 4 m
Leaves (needles) – all in pairs	***3–8cm*** long; bright mid-green, ***twisted***	***2.5–8cm*** long; grey-or blue-green	***6–18cm*** long; grey-green, straight or somewhat twisted	***10–25cm*** long; pale grey-green, rigid and spine-tipped	***3–8cm long***; bright green, curved, often twisted
Cones	***2–6cm*** long; ***pale brown-yellow*** cone, with ***slender, fragile prickle*** on end of cone scale	***2–8cm*** long; pale brown, mature to darker brown; end of exposed part of scale flat	***5–8cm*** long; yellowish-brown or pale brown, shiny, scarcely stalked; scale keeled at exposed end with persistent prickle	***8–22cm***; long, egg-shaped, symmetrical, pale shiny brown, expoed part of scale rhombus-shaped, keeled with prominent prickly protruberance	***2–5cm*** long; egg-shaped, end of exposed part of scale flat
Bark	Rich brown small square plates divided by fissures (coastal) or brown and scaly (inland)	Reddish or greyish-brown, fissured into irregular longitudinal plates	Greyish or dark brown, very rough when mature, deeply fissured	Thick, deeply fissured, dark red-brown	Grey-black and scaly

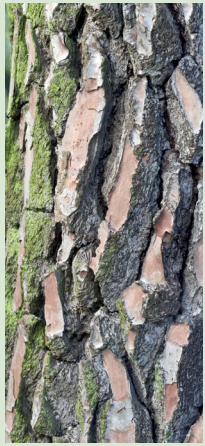


Scots Pine
Pinus sylvestris

Austrian and Corsican Pines *Pinus nigra**

Maritime Pine
Pinus pinaster

Dwarf Mountain Pine
Pinus mugo



* Two subspecies