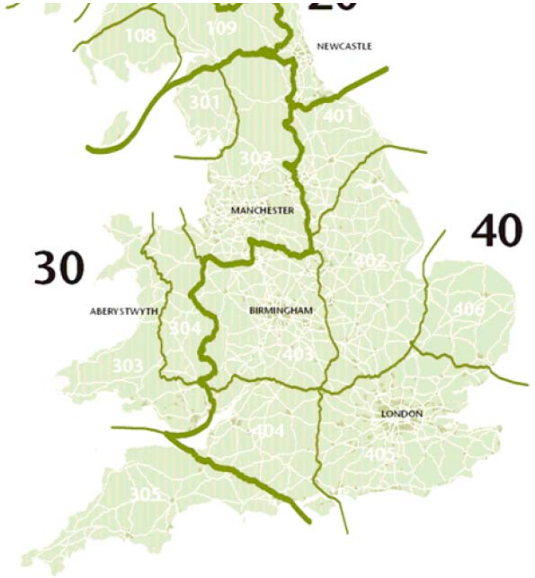
FEE other conifers

Western red cedar	Thuja plicata
Western hemlock	Tsuga heterophylla
Leyland cypress	Cupressocyparis leylandii
Lawson cypress	Chamaeccyparis lawsoniana
Atlantic cedar	Cedrus atlantica
Japanese incense cedar	Cryptomeria japonica
Coast redwood	Sequoia sepervirens
Wellingtonia	Sequoiadendron giganteum

	Use as normal where appropriate
	Use, monitor and review
	Do not use

UK provenance zones to determine origin / provenance of seed used



Western red cedar

Native range

Native to the Pacific north-west of America with a wide range from Alaska to California and also inland to the Cascade Mountains.

Site requirements

A shade tolerant species with good vigour and volume production, although early growth can be slow. Best suited to more humid regions with an annual rainfall of > 800 mm. Cold hardy throughout Britain, moderately frost tolerant, does not withstand exposure, but is moderately drought tolerant. Vulnerable to fungal attack in nurseries which historically has restricted planting stock availability. Grows best on medium to very rich soils with fresh to moist soil moisture but will tolerate calcareous soils if grown under light shelter. Not suited to very poor and very dry soils but will grow on gleys and occurs on some peat soils in its natural range. Can be grown in mixture with a range of conifer and broadleaved species.

Pests and pathogens

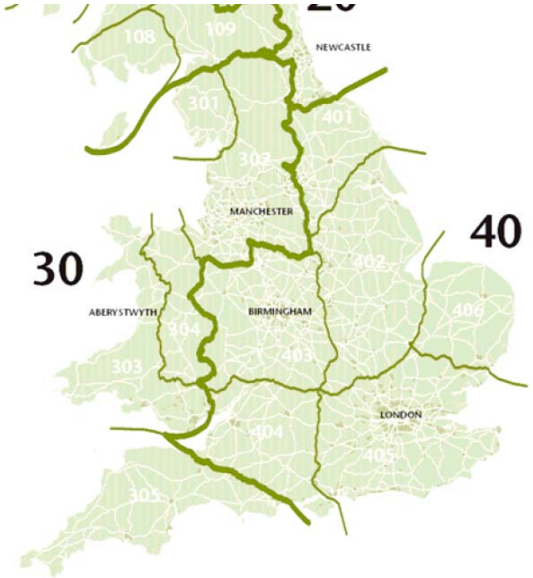
Markedly susceptible to *Armillaria* (honey fungus) as a cause of decay and death, and to *Heterobasidion* (Fomes root and butt rot) as a cause of decay. Cypress aphid (*Cinara cupressivora*) is a not uncommon cause of foliage browning on western red cedar.

Use

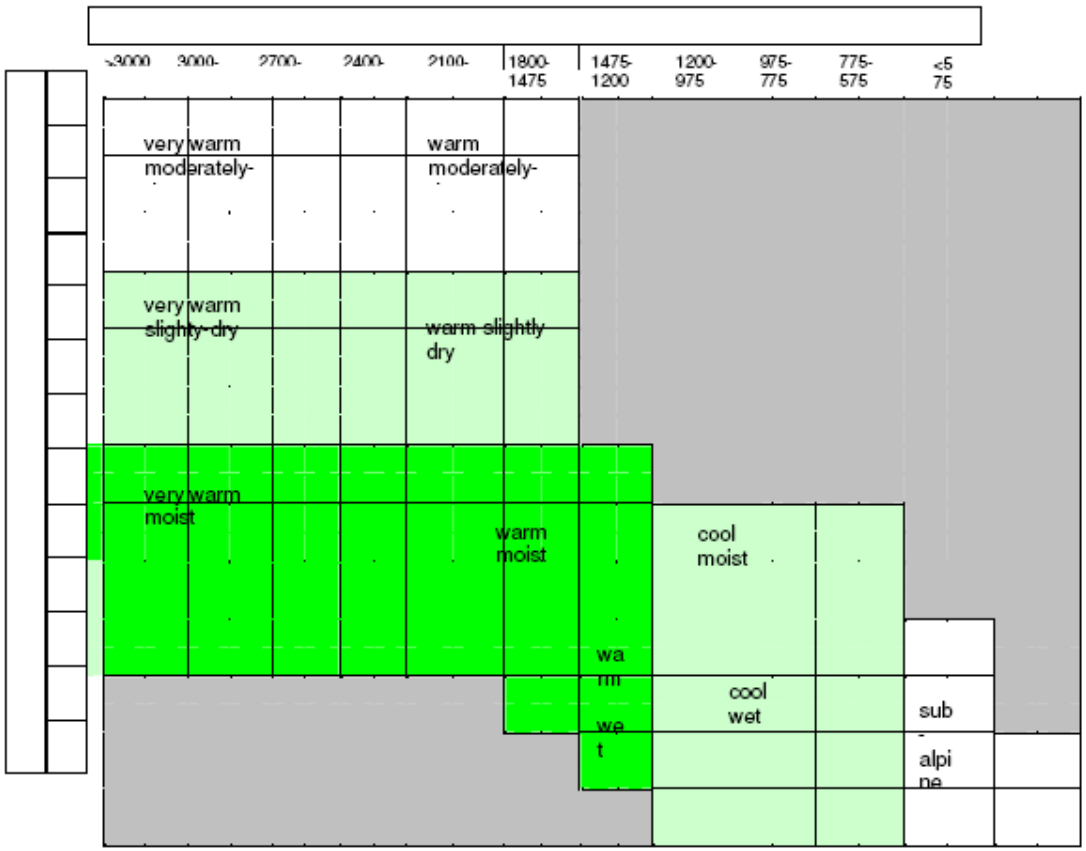
Currently a minor species in Britain, but may find an expanded role as a means of diversifying upland conifer forests as an adaptation to projected climate change.

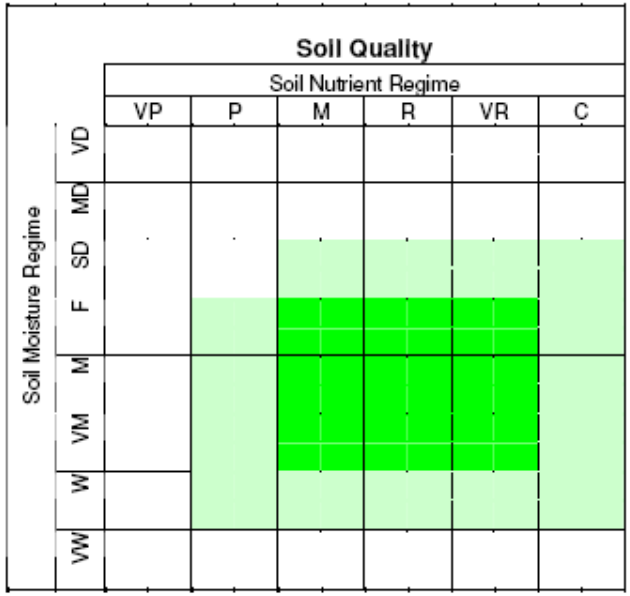
109	Kielder	Dean	WACO
204	North East Lowland	Dean	NWCA
301	Lake district	Dean	WACO
302	North West	Dean	WACO
305	Peninsular		NOCO
401	Yorkshire Moors		NWCA
402	East Midlands		SWCA
403	West Midlands		NWCA
404	West England		NOCO
405	South East		SWCA
406	East Anglia		SWCA

Seed Orchard Identity: tpcOR3QU	Dean
Stand Identity: tpcST40-01SE	Bridgenorth private



Western Red Cedar - *Thuja plicata*

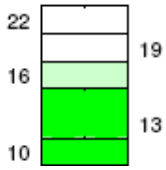




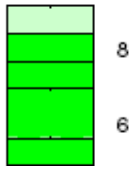
KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain

Windiness



Continentality



Forestry Commission England

Western hemlock

Native range

Native to the Pacific north-west of America with a wide range from Alaska to California.

Site requirements

A shade tolerant species best suited to moister climates in Britain with >1000 mm rainfall. It has rapid growth and high volume production on suitable sites and regenerates freely in a wide range of upland forests. It is cold hardy throughout Britain, but is very sensitive to late frosts, does not tolerate exposure and is drought sensitive. As a consequence trees are often of poor form (e.g. multi-stemmed). These factors mean that it should not be used for afforestation of open ground, but it can be planted under light shade. Although it suffers from heather competition, it will grow on soils of very poor to medium nutrient status and of slightly dry to moist soil moisture. Not suited to peats or very dry soils. Best growth will be found on acid brown earths on lower valley sides in upland forests. Can grow in mixture with other conifers such as Sitka spruce and Douglas fir.

Pests and pathogens

Largely free of major pathogens, western hemlock is nonetheless considered highly susceptible to *Heterobasidion* (Fomes root and butt rot).

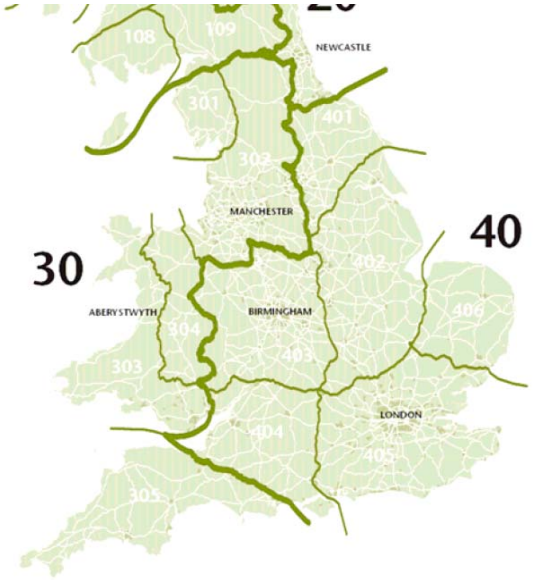
Use

Although currently a minor species, its high regeneration capacity means that it is likely to persist in many upland forests.

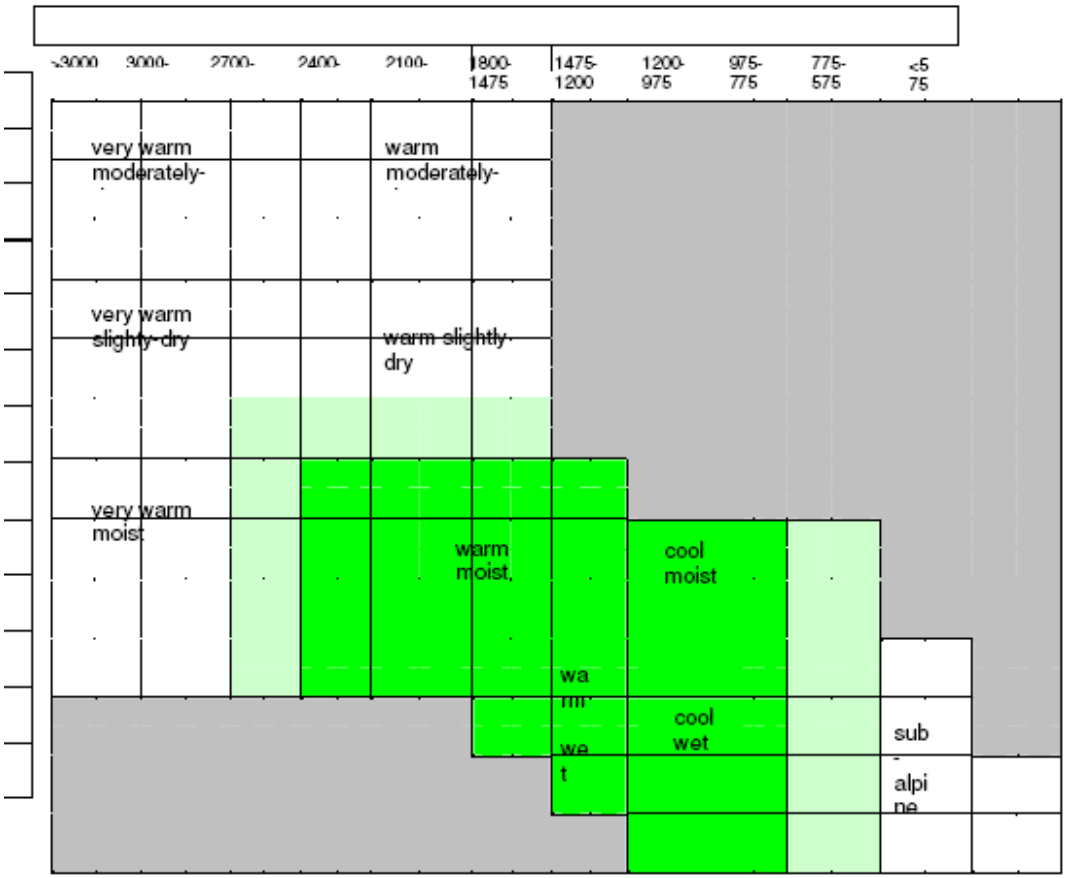
Forestry Commission England

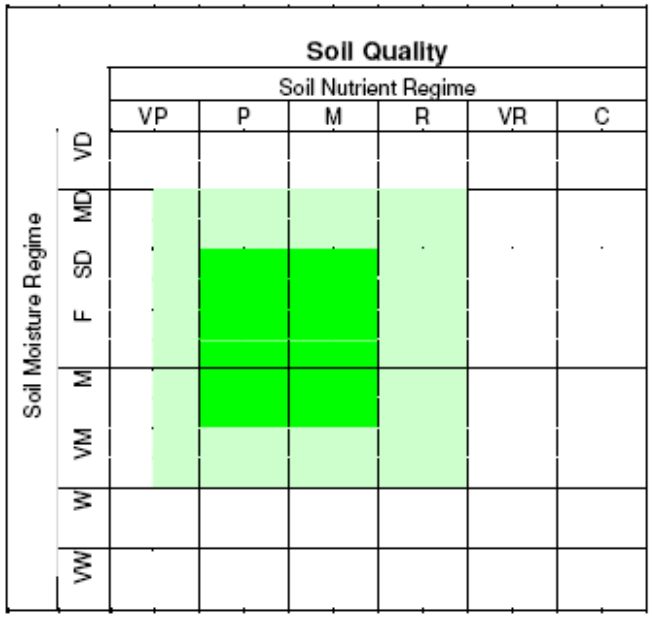
109	Kielder	WACO	
204	North East Lowland	SWCA	
301	Lake district	WACO	
302	North West	WACO	
305	Peninsular	NOCO	
401	Yorkshire Moors	SWCA	
402	East Midlands		212
403	West Midlands	NOCO	
404	West England	NOCO	
405	South East		212
406	East Anglia		212

No English stands
No French
Vey good underplanting



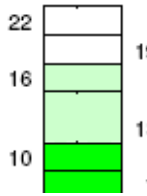
Western hemlock - *Tsuga heterophylla*

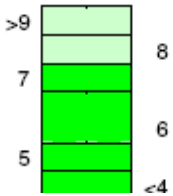




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





Forestry Commission England

Leyland cypress

Native range

A hybrid between Monterey and Nootka cypresses.

Site requirements

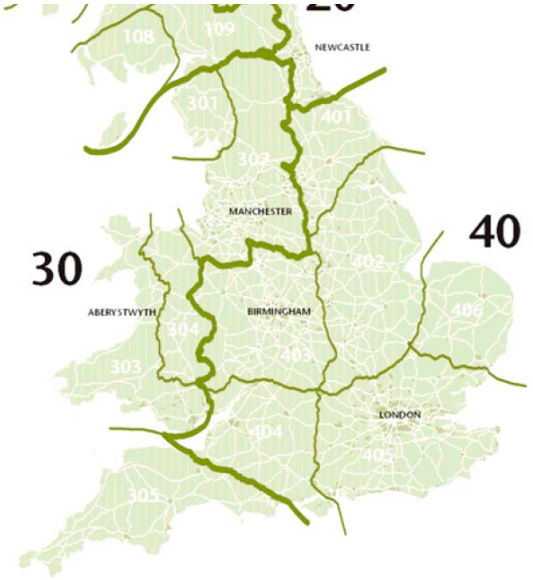
Leyland cypress is cold hardy throughout Britain, is not frost sensitive and shows very rapid early growth on a wide range of soils of poor to medium fertility. It is not suited to peats or soils of very poor nutrient status, but appears to grow on alkaline soils. The rapid early growth and moderate tolerance of exposure explains its popularity for hedging, but it is not suited to exposed upland sites, where it is also prone to snow breakage. It is probably best suited to more sheltered sites in western and southern Britain with >800 mm rainfall.

109	Kielder	FR hold clones
204	North East Lowland	FR hold clones
301	Lake district	FR hold clones
302	North West	FR hold clones
305	Peninsular	FR hold clones
401	Yorkshire Moors	FR hold clones
402	East Midlands	FR hold clones
403	West Midlands	FR hold clones
404	West England	FR hold clones
405	South East	FR hold clones
406	East Anglia	FR hold clones

Pests and pathogens

Seiridium canker (*Coryneum cardinale*) causes scattered twig and branch death on affected trees. Cypress aphid (*Cinara cupressivora*) also causes similar symptoms of foliage browning, although the causal agent is very different.

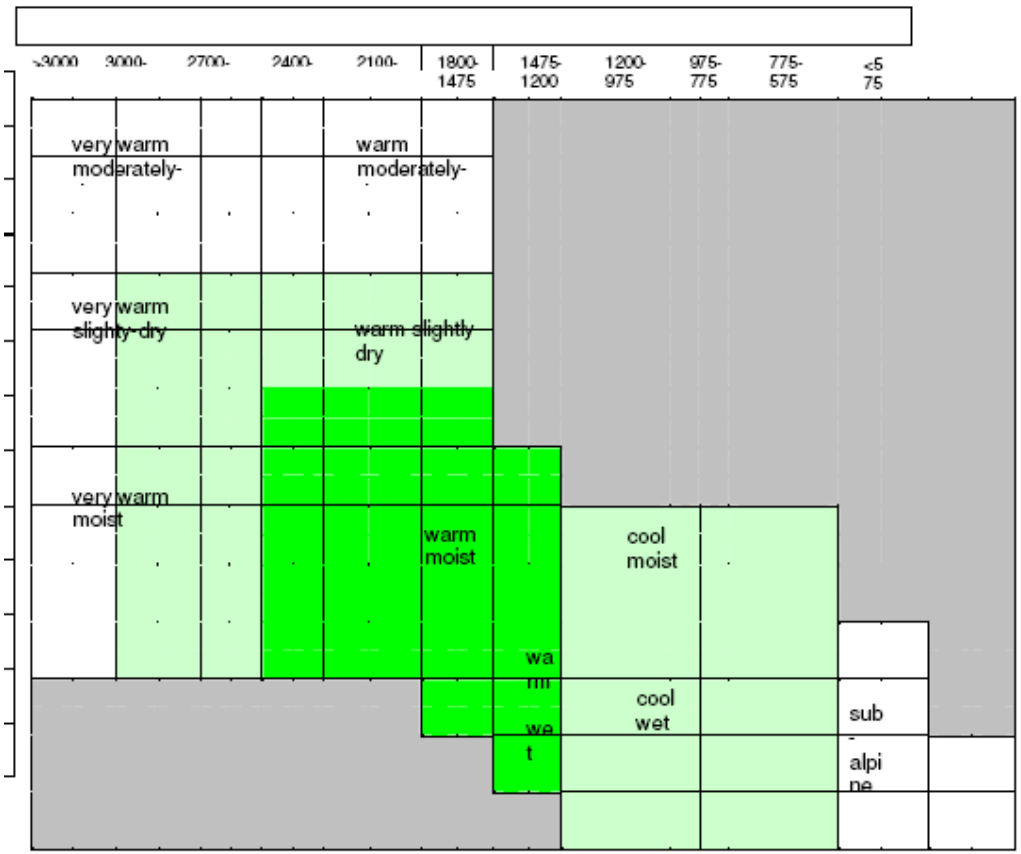
Leyland cypress is also considered highly susceptible to *Armillaria* root rot (honey fungus) and Phytophthora root rot (particularly *P. cinnamomi*). Infection by either pathogen can lead to severe dieback or death.

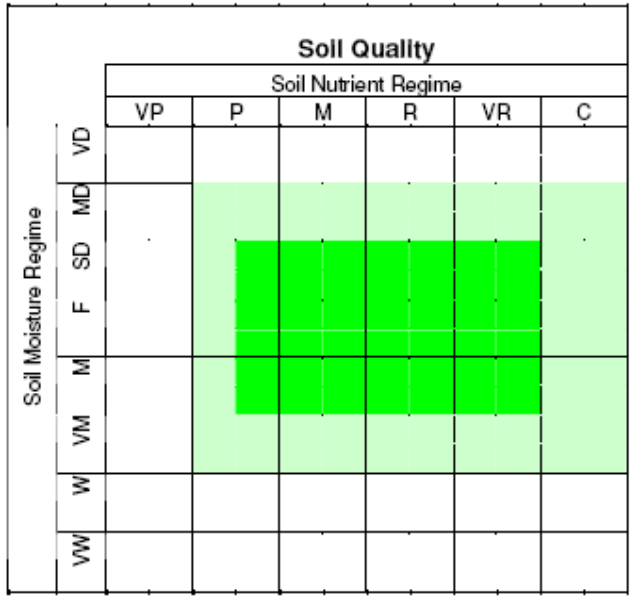


Use

The timber is naturally semi-durable. This is a species which could find an expanded role with climate warming, particularly in western Britain and on other sites with adequate soil moisture.

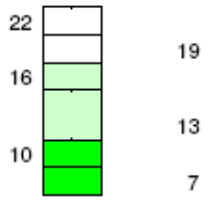
Leyland cypress - x *Cupressocyparis leylandii*

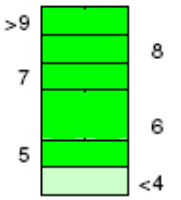




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





Forestry Commission England

Lawson cypress

Native range

Native to the coastal regions of north-west America in southern Oregon and northern California.

Site requirements

The species is adapted to warm moist conditions and is not tolerant of exposure. It is a shade tolerant species and in its natural range it maintains a slow but steady rate of growth for several centuries; the timber from older trees is highly valued. It can grow on a wide range of soil types and fertility provided there is adequate (not stagnant) soil moisture within a metre of the surface. However, it is not suited to very poor peats or sites with heavy heather competition; the species appears to have some tolerance of alkaline soils. It is cold hardy throughout Britain and is frost tolerant and withstands moderate pollution. Many British stands have a large number of forked stems.

Pests and pathogens

Root rot pathogens *Phytophthora cinnamomi* and *P. lateralis* are very damaging, and potentially lethal diseases of Lawson cypress. *P. lateralis* was considered absent from Britain until discovered in Scotland in late 2010. Nursery stock, ornamentals and plantation grown trees are all subject to attack by *P. lateralis* in the USA where this pathogen is best known. Chamaecyparis is also considered to be particularly susceptible to *Armillaria* root rot (honey fungus).

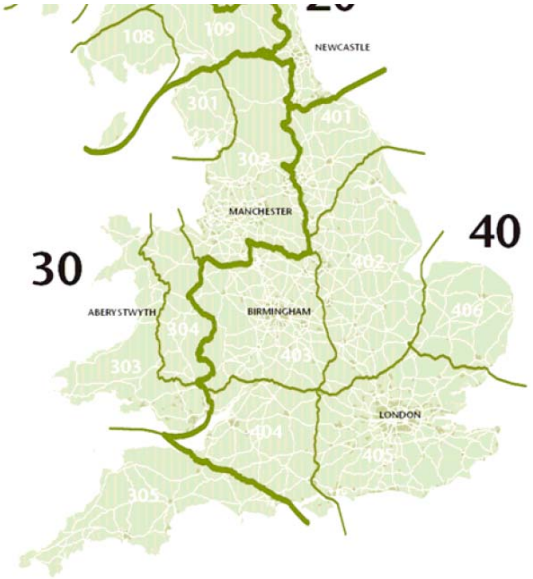
Less damaging but also significant, another introduced pathogen, Seiridium canker (*Coryneum cardinale*) causes scattered twig and branch death on affected trees. Cypress aphid (*Cinara cupressivora*) is not uncommon as the cause of foliage browning.

Use

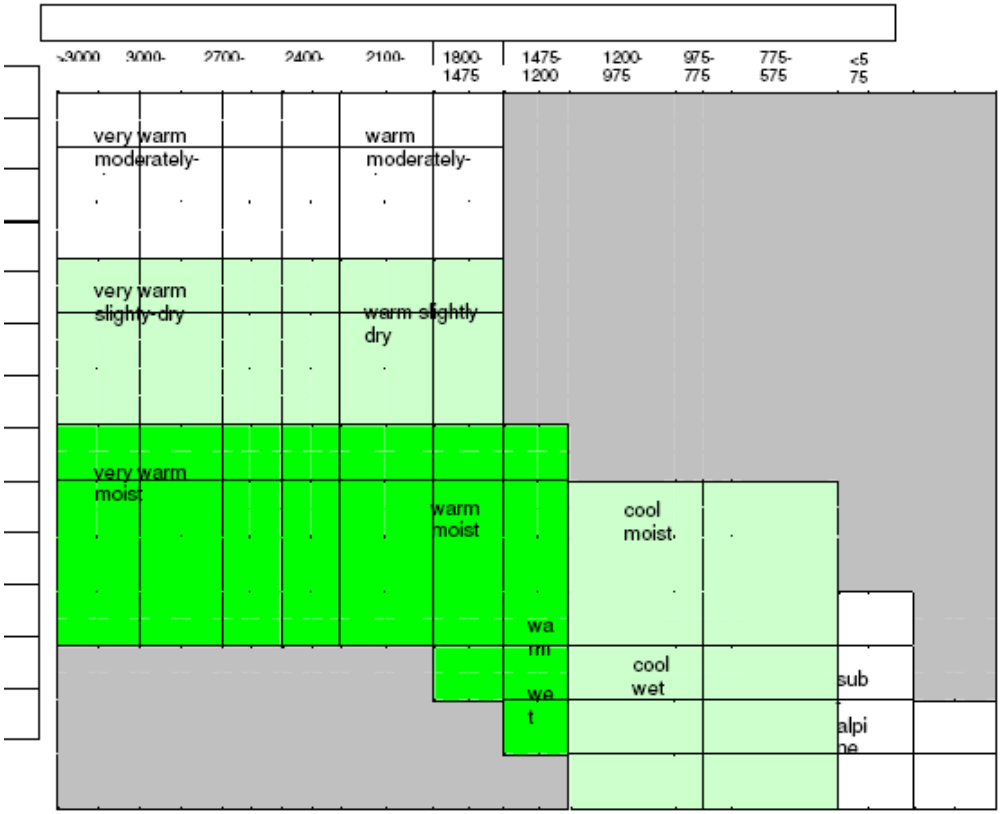
The species could find a greater role with climate warming, but the poor stem form and relatively slow growth suggest that it is likely to remain a minor species.

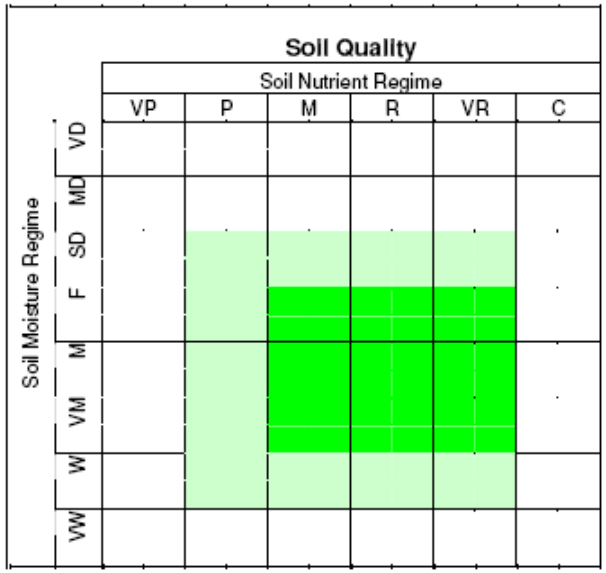
Forestry Commission England

109	Kielder	WACO
204	North East Lowland	WACO
301	Lake district	WACO
302	North West	WACO
305	Peninsular	SOCO
401	Yorkshire Moors	NOCO
402	East Midlands	NOCO
403	West Midlands	NOCO
404	West England	NOCO
405	South East	SOCO
406	East Anglia	SOCO



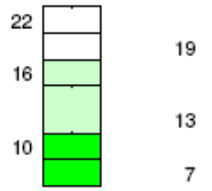
Lawson's cypress - *Chamaecyparis lawsoniana*

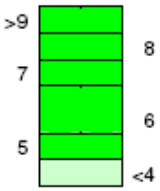




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





Forestry Commission England

Atlantic cedar

Native range

Native to the Atlas mountains of Algeria and Morocco and also used as a plantation species for forest restoration in southern France.

Site requirements

The species appears to be hardy to at least -20°C in Britain, but growth and survival is poor in high rainfall areas, so planting should be confined to warmer areas with <1500 mm rainfall. It grows best on soils of poor to medium nutrient status and of dry to fresh soil moisture. It is not suited to peats or other wet soils but it will grow on alkaline soils. It does not withstand exposure but is not sensitive to late frost, and it is capable of withstanding periods of drought.

Pests and pathogens

Suffers from a similar range of diseases to Lawson cypress and Leyland cypress. These include cypress canker *Seirium cardinale*) as well as Cypress aphid (*Cinara cupressivora*). Root rot and even mortality caused by *Phytophthora cinnamomi* is also reported, but mainly in nurseries.

Use

This is a species which could increase in importance with climate change particularly on drier sites in southern and eastern Britain.

109	Kielder
204	North East Lowland
301	Lake district
302	North West
305	Peninsular
401	Yorkshire Moors
402	East Midlands
403	West Midlands
404	West England
405	South East
406	East Anglia

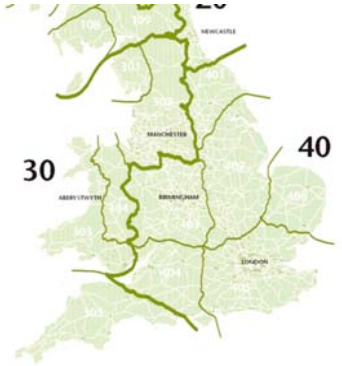
Forest use
MENERBES

Forest use
MONT VENTOUX

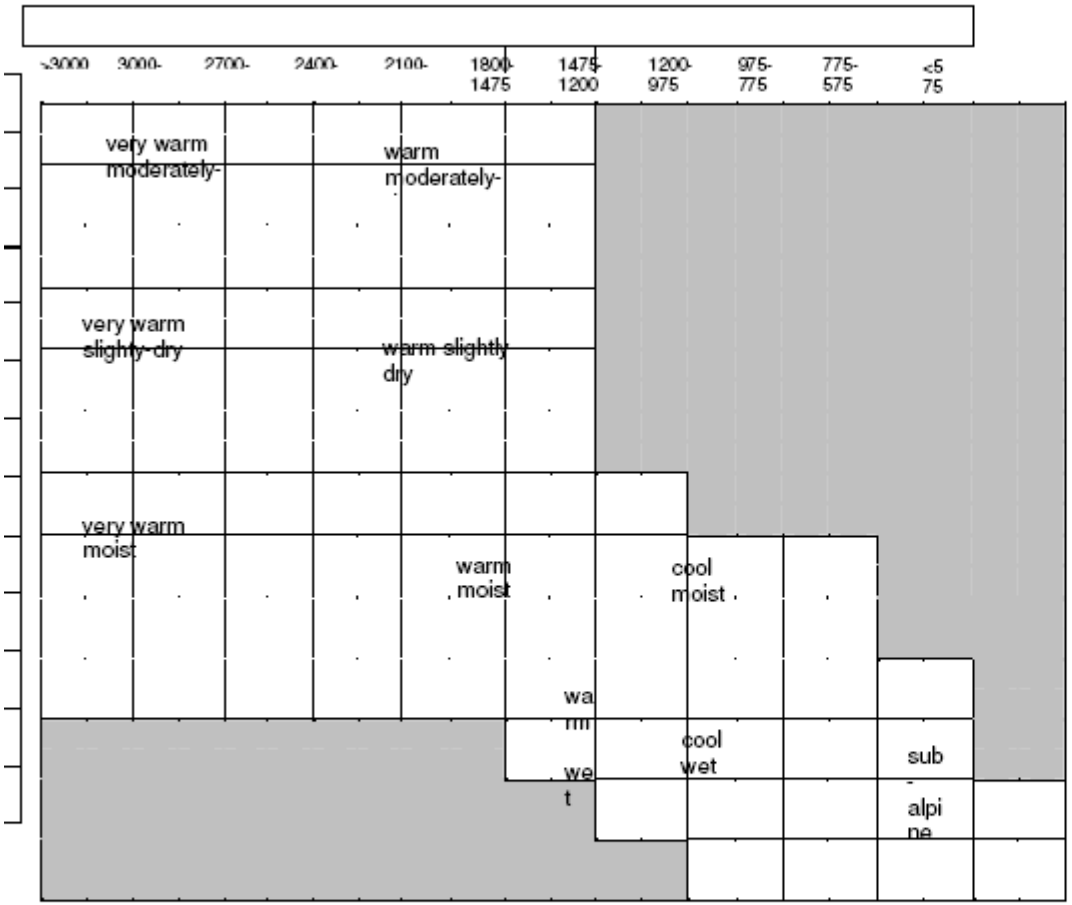
Forest use
SAUMON

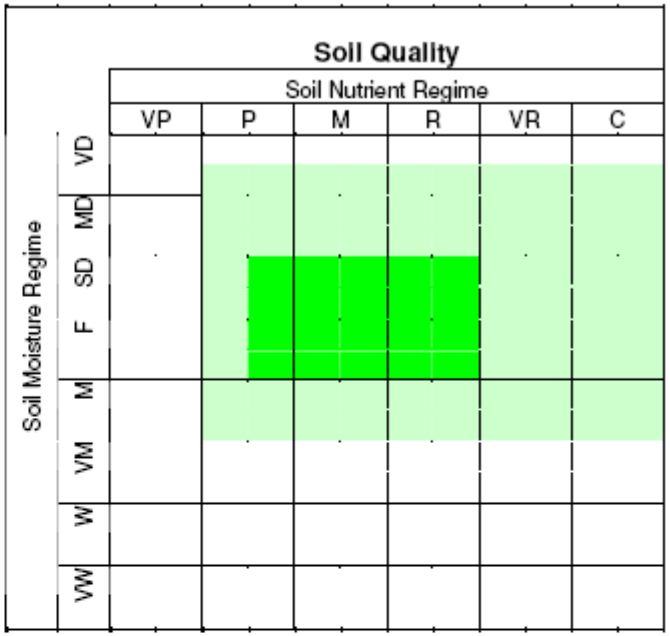
Stands chosen for their superior growth.

Forest use
CAT900 FRANCE



Atlas cedar - *Cedrus atlantica*





KEY

	Very Suitable
	Suitable
	Unsuitable
	Not present in Britain

Windiness

22	
	19
16	
	13

Continentality

>9	
	8
7	
	6

Forestry Commission England

Japanese red cedar

Native range

Native to the central and southern islands of Japan where it is a major timber species.

Site requirements

The species is adapted to a warm maritime climate and best growth in Britain is to be found in areas with >1200 mm annual rainfall. The need for warm growing conditions means that the best stands are to be found in Wales or south-western England where the species can be a very high volume producer. Best growth is on soils of poor to rich soil nutrient status and slightly dry to moist soil moisture. It is not suited to very poor or dry soils, to peats or to alkaline soils. This is a high quality timber species, although pruning is an important component of management regimes in Japan. A very shade tolerant species which is moderately resistant to exposure although the crowns can be liable to snow break.

Pests and pathogens

Japanese cedar is susceptible to Phytophthora root disease, including *P. cinnamomi*. It is also considered to be susceptible to *Armillaria* root rot (honey fungus). Elsewhere, it has been reported to be affected by Juniper blight (*Phomopsis juniperovora*) which is present in Britain and already widespread on juniper.

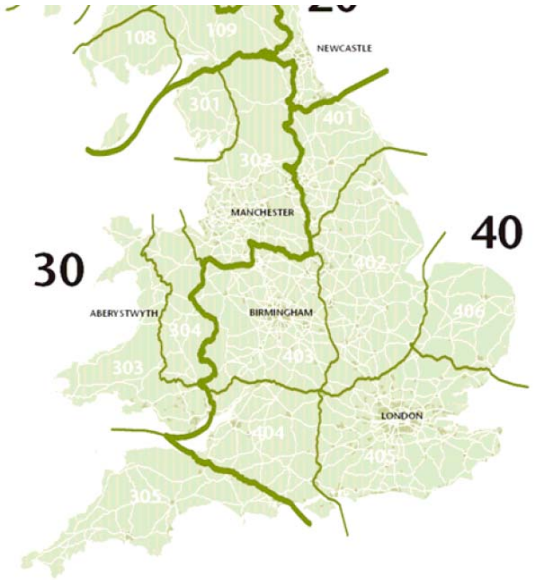
Use

Climate warming should increase the range of sites where the species will grow well such as in western Scotland.

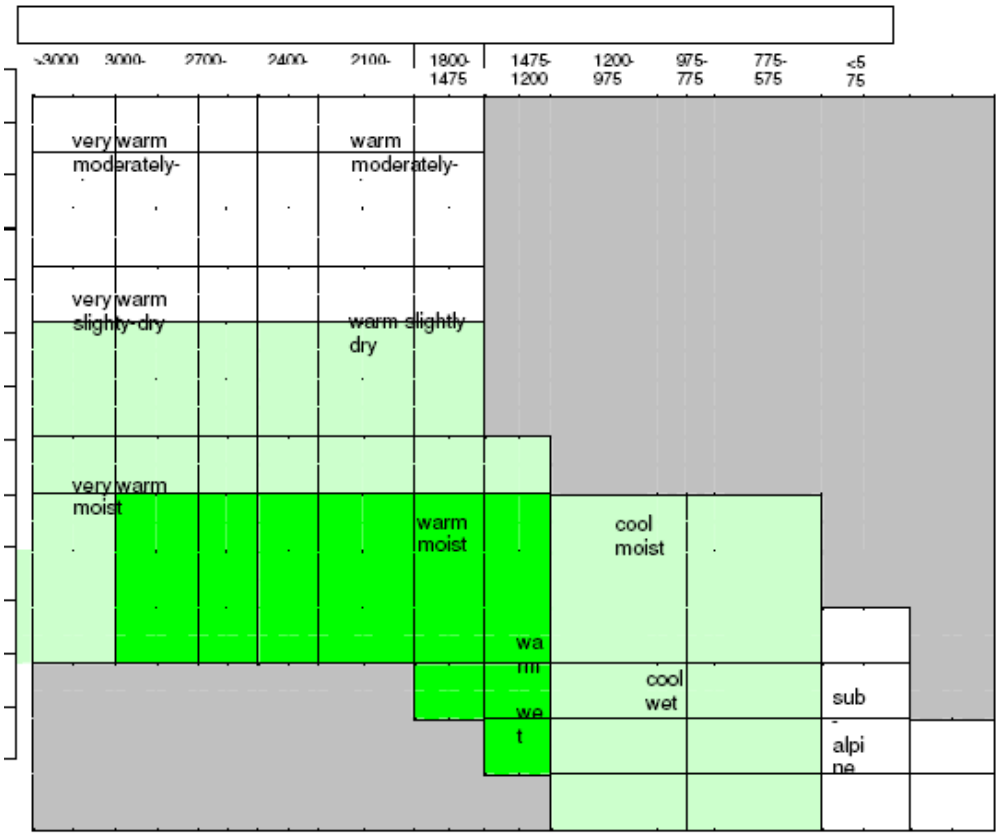
Forestry Commission England

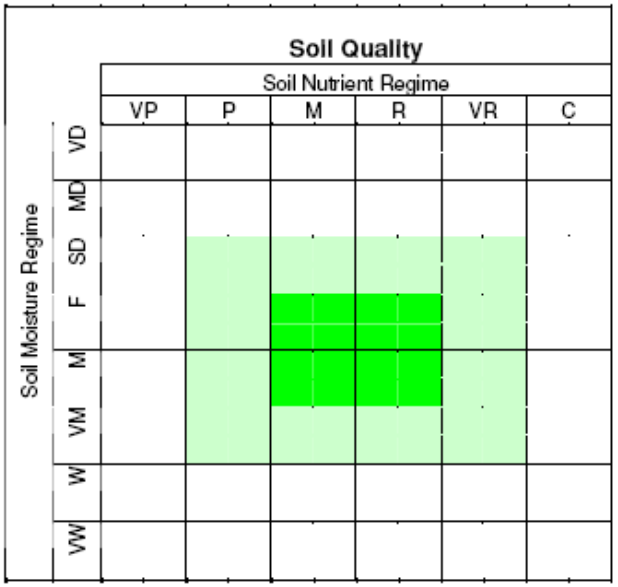
109	Kielder
204	North East Lowland
301	Lake district
302	North West
305	Peninsular
401	Yorkshire Moors
402	East Midlands
403	West Midlands
404	West England
405	South East
406	East Anglia

No seed source information available
Forestart have imported from China
Japan has a breeding institute



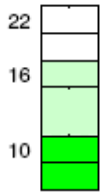
Japanese Red Cedar - *Cryptomeria japonica*

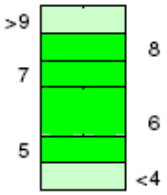




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





Forestry Commission England

Coast Redwood

Native range

Native to the coastal zones of central and northern California.

Site requirements

A shade tolerant species with rapid early growth and high volume production on suitable sites. Naturally occurs in a mild climate with frequent summer fogs; currently probably best suited to Wales and south-west England in areas with more than 1250 mm rainfall although it will grow in eastern Britain on suitable soils. May not be fully cold hardy in Britain, is sensitive to late frosts, does not withstand exposure and is not drought tolerant. Best growth is on poor to medium soils of fresh or moist soil moisture status. Is not suited to heavier gleys, peats or very poor dry soils. Regenerates from seed or from sprouts from cut stumps.

Pests and pathogens

No insect pests or diseases of major concern are noted for the coast redwood. In its native range it is commonly reported to have fewer foliar pathogens than any other major tree species. A curiosity rather than of major significance, *Phytophthora ramorum* has been reported to infect foliage of coast redwood.

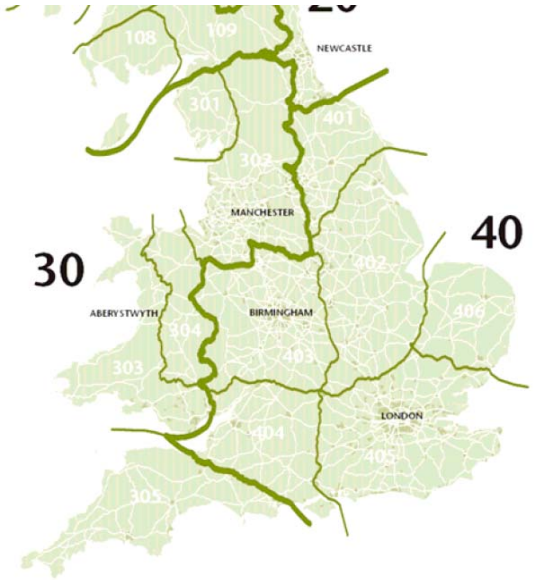
Use

This is a species that could be grown more widely in Britain with climate warming, not least because it produces a high quality timber.

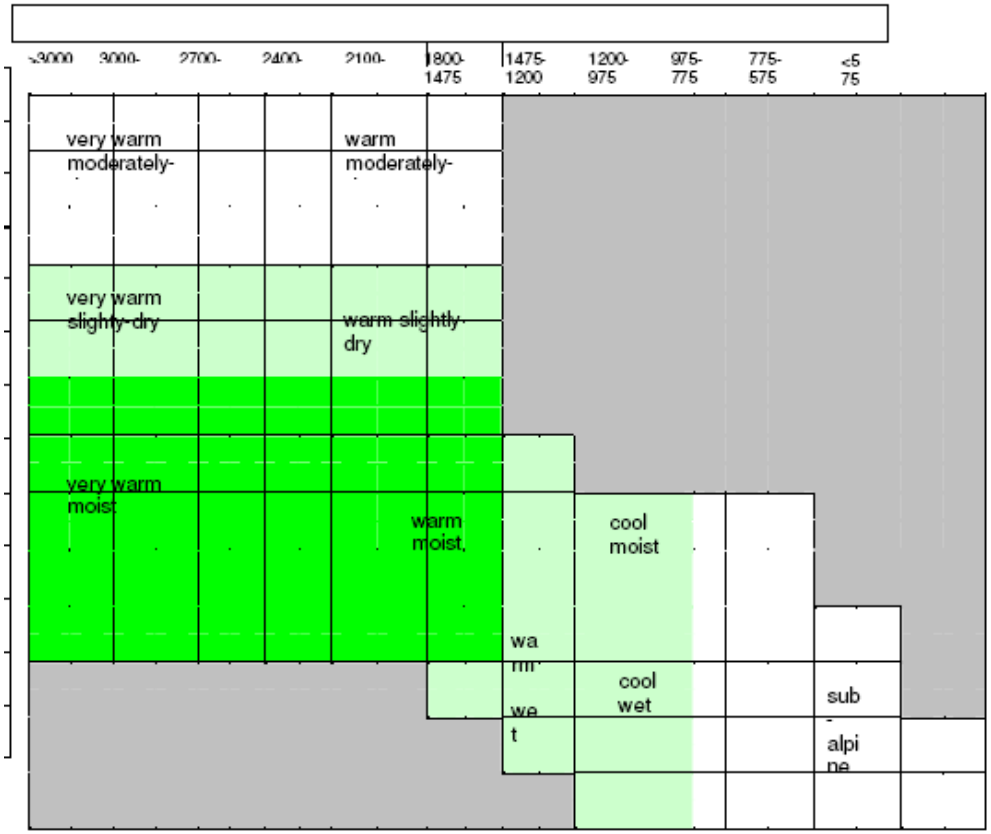
109	Kielder	
204	North East Lowland	NOCO
301	Lake district	NOCO
302	North West	NOCO
305	Peninsular	SOCO
401	Yorkshire Moors	NOCO
402	East Midlands	
403	West Midlands	NOCO
404	West England	SOCO
405	South East	SOCO
406	East Anglia	

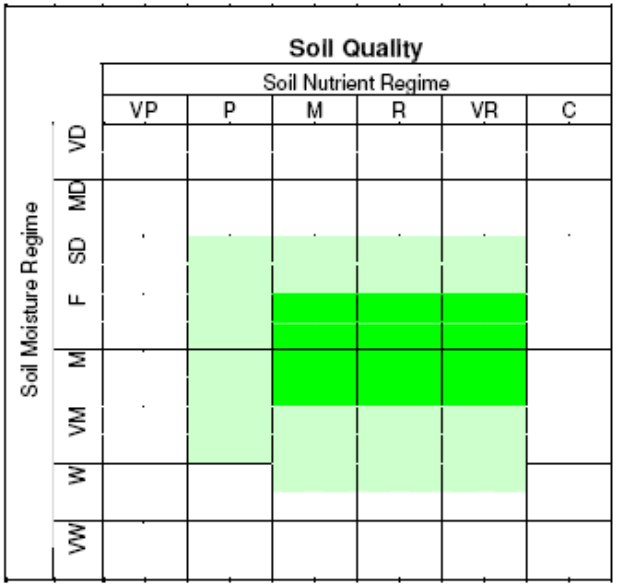
NZ Forest advisorys recommend against home collections advice is to go for wild collected

No registered stands
Longleat has 120 hectares



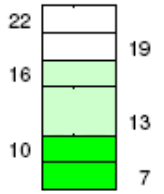
Coast redwood - *Sequoia sempervirens*

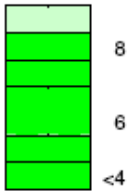




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





Forestry Commission England

Wellingtonia

Native range

Native to a restricted range in the Sierra Nevada mountains of central California.

Site requirements

This is a shade intolerant species which can make rapid early growth and produce high volumes on suitable sites. Naturally occurs in a humid climate with dry summers and appears somewhat more cold tolerant than coast redwood and it is more tolerant of drought and exposure than that species. Best growth is on poor to medium soils of slightly dry to fresh soil moisture status such as acid sandy loams. Is not suited to heavier gleys, peats or very poor dry soils. Plantation stands are reported to produce timber of similar quality to coast redwood.

Pests and pathogens

Susceptible to *Armillaria* (honey fungus) and *Heterobasidion* (Fomes root and butt rot) as a cause of decay in the heartwood of living trees. Although both species can be serious root pathogens they generally do not kill trees directly, but cause root or stem failure.

Use

A species that could be grown more widely throughout Britain with climate warming, on suitable soils in areas with adequate but not excessive rainfall (e.g. 800-1750 mm rainfall).

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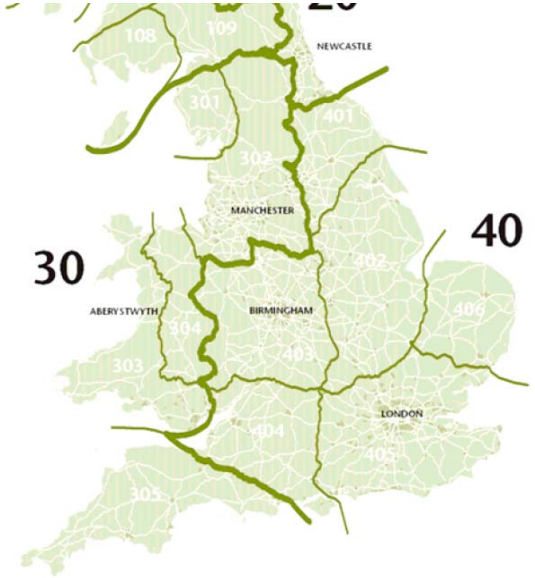
109	Kielder
204	North East Lowland
301	Lake district
302	North West
305	Peninsular
401	Yorkshire Moors
402	East Midlands
403	West Midlands
404	West England
405	South East
406	East Anglia

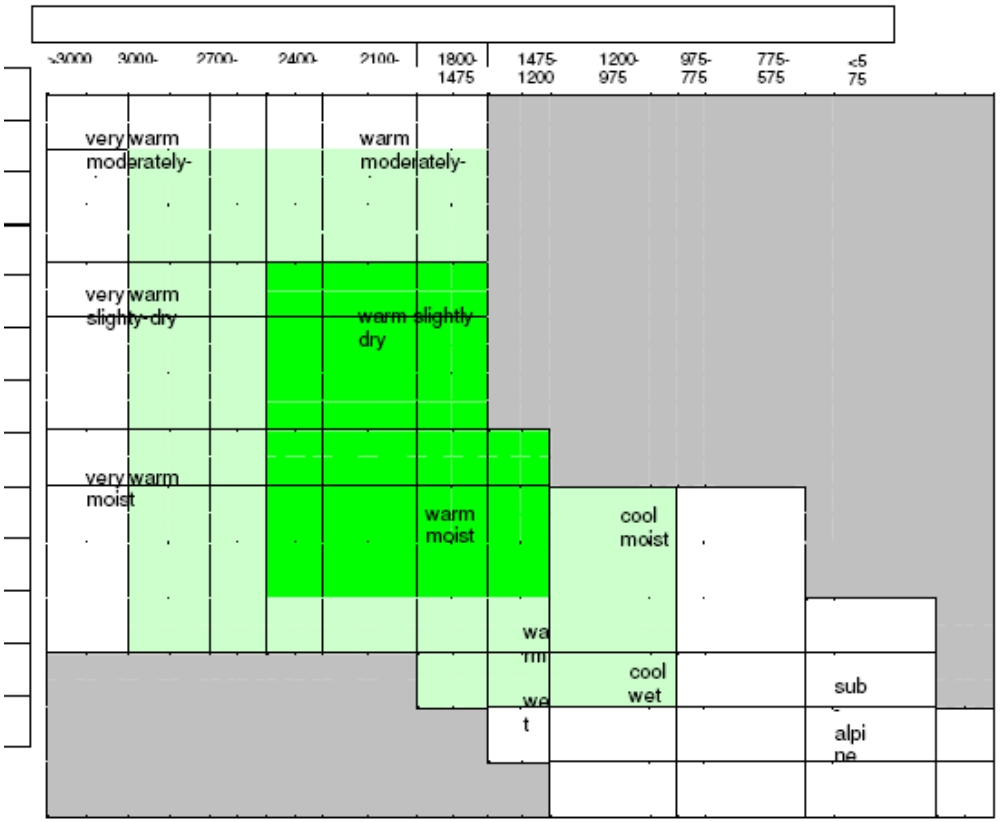
Some evidence that it will take more exposure than CR

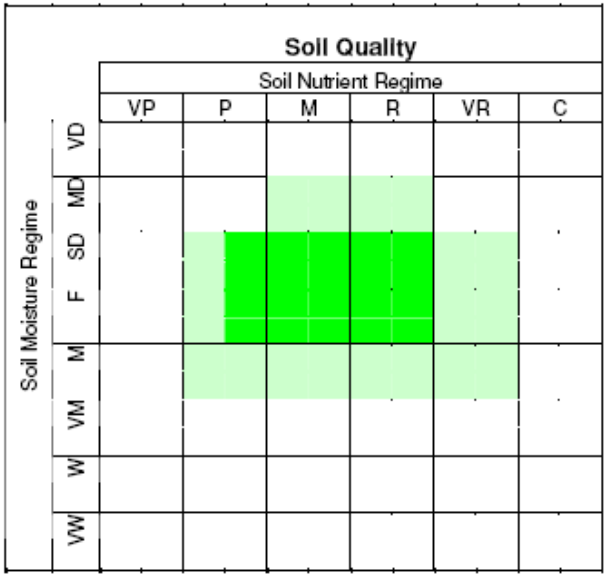
Establishment can be challenging

As far north in California as obtainable



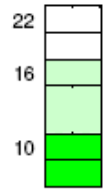
Wellingtonia - Giant redwood - *Sequoiadendron giganteum*

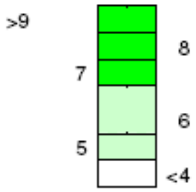




KEY

- Very Suitable
- Suitable
- Unsuitable
- Not present in Britain





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