# Planting juniper in Scotland: reducing the risk from *Phytophthora austrocedrae*

## Introduction

This note gives initial guidance on how to reduce the risk of causing further spread in Scotland of a pathogen of juniper called *Phytophthora austrocedrae* when carrying out planting of juniper and associated activities. The guidance will be reviewed as experience of the pathogen is developed. Equivalent guidance has been prepared for England and Wales and is available from the Food and Environment Research Agency.

This note focuses on the main situations where juniper is planted in Scotland to conserve and expand wild populations of juniper:

- woodland creation or management schemes carried out by FCS on the National Forest Estate (NFE), or by other woodland owners supported by grants.
- planting in moorland or woodland areas which is not supported by grants.
- planting in mitigation for development such as wind farms.

Some aspects of the guidance may also be helpful in relation to planting juniper for landscaping around roads and other developments or for garden and ornamental planting.

## Background

Juniper *(Juniperus communis*) is a priority species for conservation which has experienced a large decline over most parts of the British Isles in recent decades. Plantlife Scotland, Forestry Commission Scotland (FCS) and Scottish Natural Heritage are working together to help conserve juniper in Scotland. In 2009 FCS published a programme for juniper which is one of 6 key species for priority action.

A new disease threat to juniper has recently emerged - *Phytophthora austrocedrae*. It has only recently been identified as a causal agent of juniper die-back and death in the British Isles and now been detected in a number of wild populations in Scotland and northern England. Serious mortality has resulted in at least one Scottish site and it is a potential threat to the wider juniper population if it spreads. The organism has also been detected in some nursery stock of juniper in Devon and on isolated Scottish specimens of Nootka cypress, Lawson's cypress and ornamental juniper.

The FC website has information on the organism, its possible means of transmission and the action being taken to respond to it.

## Current advice on juniper conservation in Scotland

The juniper programme published by FCS set out a strategy based on 3 zones, which includes advice on the use of planting: see Figure 1 and the text box below. These recommendations now need to be reconsidered in response to *P. austrocedrae.*

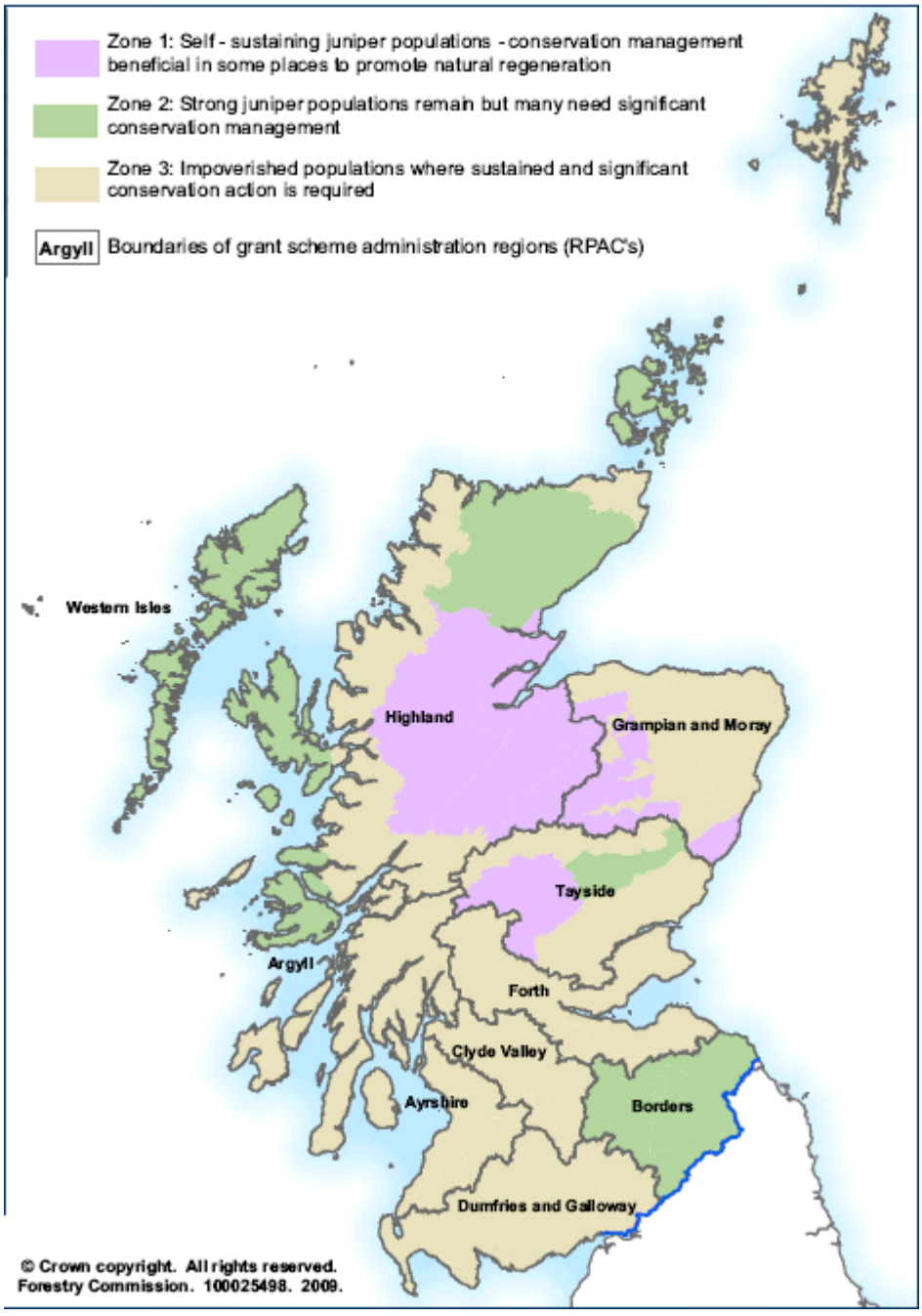


***Figure 1. Conservation zones for juniper in Scotland***

### *Conservation approach for each zone*

Zone 1: Self-sustaining juniper populations –conservation management beneficial in some places to promote natural regeneration.

- Management is either already suitable for juniper conservation or could readily be made suitable mainly through control of grazing regimes. ***Planting will rarely be required.***

Zone 2: Strong juniper populations remain but many need significant conservation management.

- Woodland juniper has suffered some decline, but there is some potential for regeneration, with help from measures like fencing, deer control, conservation grazing and selective tree felling to reduce shade. Management of moorland sites could be improved by controlling the timing and intensity of grazing, protecting bushes from muirburn and removing encroaching vegetation. ***Some planting may be required for small or moribund populations***

Zone 3: Impoverished populations where sustained and significant conservation action is required.

- Juniper is scattered and typically in small and/or over mature populations with little regeneration. Action should concentrate on reducing grazing impact and bulking up populations quickly, focusing especially on populations that would help maintain the species range. In woodlands, fencing, deer control, selective felling and conservation grazing may all help to secure regeneration. ***Planting will often be needed to secure minimum breeding populations of 50-100 plants before the current old bushes die out***. ***Planting should also be used to help restore juniper's range as part of wider efforts to increase forest biodiversity***

## What are the risks of spreading P. austrocedrae infection by planting juniper?

*P. austrocedrae* is a fungus-like plant pathogen which causes an often fatal disease of its host plant. Above-ground symptoms on infected trees include dieback of the foliage, stem and collar lesions. When roots and stem bases are affected, the foliage of infected trees initially appears a slightly lighter colour than that of healthy trees. Later the foliage withers, turns bronze, and finally, light brown, together with drying and darkening of the inner bark.

Disease symptoms caused by *P. austrocedrae* can be confused with other infections, including those caused by other Phytophthora species, such as *P. cinnamomi*, a pathogen which is already present on a range of host plants in the UK and around the world. Physical damage caused by heavy snow or drought might result in similar browning of the foliage, but there would be no associated lesions.

*P. austrocedrae* spores are most likely to be spread in soil and water. The risk of infection seems to be higher on wet soils. It is therefore important to ensure that any risks of spread of *P austrocedrae* from site to site are minimised by taking adequate biosecurity measures, and if infection is found effective disposal methods should be used.

Planting could introduce infection to new areas and populations of juniper if the planting stock has been infected before arriving at the site (or if spores are carried in from other infected areas). Nurseries are inspected for disease symptoms, but latent infections are possible. As with all plant purchases it is therefore necessary to judge the relative risk of planting - or not planting - on any given site and to consider whether there is a need to mitigate any potential impacts.

We are at an early stage in our understanding of this pathogen, and over the 2 years to 2015 we hope that joint survey and research work will enable us to develop a more comprehensive response.

# Initial planting guidance in response to *P. austrocedrae*

## General advice

***Consider the risks and benefits of planting juniper for your site to help you make a decision on where to plant and the precautions you can take to prevent the spread of this disease.***

***In healthy juniper populations, and in areas where planting is not urgently needed or where natural regeneration is feasible, planting should currently be avoided wherever possible. This approach is generally recommended for zones 1 and 2.***

However, complete restriction on planting could quite quickly create greater problems by allowing small remnant populations composed of old bushes to die out. Spread of a primarily soil-borne pathogen such as *P. austrocedrae* between isolated new juniper populations may be a relatively low risk if biosecurity is effective.

***Therefore planting may still be appropriate in some cases, mainly in zone 3.***

***Because symptoms are hard to detect and take some time to develop, it is hard to be sure that juniper plants are not infected when they are received from nurseries.***
***Therefore, where practical, consider keeping juniper nursery stock for a whole growing season before planting out, to see if symptoms develop. This will minimise the risk of introducing a problem, and will also help to increase our understanding of the disease.***

Plants should be kept on a hard standing or on a discrete area of freely draining soil without risk of standing water or surface water draining directly into ditches or watercourse, and well away from the final planting position and isolated from existing juniper.

***Any risks from planting can also be reduced by:***

- ***keeping planting away from existing populations,***
- ***planting freely drained sites away from watercourses,***
- ***wide spacing and regular inspection and removal of potentially infected plants after planting (see detailed advice section below).***

***In all cases ask the plant supplier to explain what steps they have taken to address biosecurity in their nursery and what steps they have taken to assess the health of the stock they are selling.***

- For example ask whether the stock has been inspected for disease symptoms (but bear in mind that latent infection may not yet show), whether there have been any cases of disease and whether fungicides have been used.

***After planting, undertake annual surveys through to establishment (year 5) to check for disease symptoms.***

***In all planting use suitable provenances as guided by FCS Guidance Note 'Seed sources for planting native trees and shrubs in Scotland' FCS 2006.***

# Detailed advice

## Planting in or close to existing populations of juniper

- Avoid planting in or adjacent to healthy populations of over 100 mature bushes to avoid putting them at risk.
- Planting may be appropriate to bolster smaller isolated remnant populations which are at risk. Plan the planting to ensure that movement by ground water between plants or areas of plants is limited, and plant small areas of traceable

batches of juniper plants to create 'islands'. The 'islands' can be monitored and if a problem arises the infected island can be removed.

## Planting juniper at sites with no existing population

- Select drier locations or those that will drain well, not downstream/down slope of suspect or infected stands of plants.
- Do not plant near to locations with public or regular foot traffic.
- Assess establishment rates and record failed plants (identify the origin if possible) and their locations.

## Designated sites

Scottish Natural Heritage (SNH) may wish to make a site-by-site assessment of benefits and risks in relation to the conservation objectives of designated sites such as Sites of Special Scientific Interest and Special Areas of Conservation. You should consult SNH if planting is on or close to a site designated for juniper.

## Biosecurity measures for all sites

- Avoid multiple site visits in the same day; if that is not possible visit a clean/new site first then subsequent sites.
- Ensure all operators and staff have not been at other planting locations the same day and use clean clothing and footwear before entering a new site.
- Ensure all machinery and equipment is cleaned down thoroughly to remove all traces of soil and plant debris and disinfected before leaving the site then disinfect again prior to use.
- Follow full biosecurity measures each time a visit is made.

## What to do if *P austrocedrae* is suspected or confirmed?

If you suspect juniper plants are infected with *P. austrocedrae,* send juniper plants with suspect symptoms for laboratory testing for *P. austrocedrae* and please report immediately to:

Forest Research's Disease Diagnostic and Advisory Service (tel: 0131 445 2176 or e-mail: ddas.nrs@forestry.gsi.gov.uk). Alternatively you can also contact the Forestry Commission's Plant Health Service on 0131 445 2176.

# Infected sites

If infection is confirmed you may be served with a Statutory Plant Health Notice. These normally require a number of actions, such as:

- Erect information signs to explain what is happening and why.
- If appropriate and feasible, install footwear washing stations with disinfectant.
- In extremis, consider restricting access to footpaths or, in consultation with the relevant authorities, diversion of public footpaths to alternative routes.

- Require dogs to be kept under close control or on a lead in the infected area.
- Prohibit the removal of juniper plant material and soil from the infected area unless they are double-bagged (or placed in enclosed containers) and transported the minimum distance for licensed incineration or non-hazardous landfill at permitted facilities.
- Leave infected juniper bushes in situ or cut off at ground level to minimise soil erosion and soil disturbance. The cut off juniper material can then be burnt in a controlled manner. This should be in a controlled open fire in situ (subject to not creating nuisance or exceeding 10 tonnes of plant material burnt in a 24 hr period).
- Do not compost infected plants.
- For juniper bushes with recent infection, ring barking at ground level may help reduce soil inoculum levels by killing the host juniper bush more quickly than natural disease progression.
- Assess the healthy and diseased juniper bush locations and create a cordon sanitaire, taking into account the topography and hydrology to limit movement by ground water between plants.
- Carry out destructive actions on the leading edge of the infection to help protect healthy plants, then work towards infected plants.
- Follow best practice biosecurity guidance each time a visit is made.

# Guidance for tree nurseries

This section is aimed at people who are growing juniper for sale. It may also be useful for land managers who are growing their own stock; and also for those who are ordering juniper plants, so they can ask the supplying nursery for information about the plants and how they have been grown.

- Keep full traceability records, including origin and provenance of seed/cuttings supply chain history, where grown, the inspection and testing history of supplied plants, and the treatment history of fungicides.
- Isolate recent deliveries for several weeks.
- Keep batches separate and keep labelled with full supplier details.
- To avoid cross contamination, grow batches in one location and do not mix or bulk-up batches.
- Consider testing cuttings and seed for *P. austrocedrae* before further propagation
- Grow juniper plants in drier conditions using trickle irrigation, do not allow plants to stand in pools of water, and minimise splashing of water onto juniper plants.
- Avoid using re-circulated water on juniper plants.
- Weed out weak plants and destroy immediately. Do not compost such plants.
- Only use new compost. Do not re-use compost previously used on same or related species.
- For onsite testing use the Lateral Flow Device for Phytophthora available from http://www.pocketdiagnostic.com/

- Report any suspected infections of juniper plants to the Scottish Government's Horticulture and Marketing Unit (0300 244 9772 or email hort.marketing@scotland.gsi.gov.uk.)
- Follow best practice biosecurity guidance.

## Where can I get more information?

Local survey knowledge may often exist and you can get advice from FCS, Plantlife, SNH who are working together to improve our knowledge nationally.

The Native Woodland Survey of Scotland has information on juniper within native woods and in associated juniper scrub populations. You can check for presence of juniper in your area, for example, and the survey also includes information on densities and the size range of juniper populations.