

Recently, a fungus-like pathogen called *Phytophthora austrocedrae* has been found causing dieback and mortality of juniper (Figs 1 and 2) at several upland woodland sites in northern Britain. This pathogen was first described in southern Argentina in 2007 causing mortality of a native South American conifer species, *Austrocedrus chilensis*. In addition to juniper and *A. chilensis*, *P. austrocedrae* is known to infect Lawson cypress (*Chamaecyparis lawsoniana*) and Nootka cypress (*Chamaecyparis nootkatensis*). So far all known hosts of *P. austrocedrae* reside in the cupressaceae.



Figure 1: Symptoms of juniper decline at a site where trees were found to be infected with *Phytophthora austrocedrae*.

Symptoms on juniper

Phytophthora austrocedrae primarily attacks the roots and stem bases of juniper. Infections may extend to 50 cm or more up diseased stems. Infected trees have foliage reddening and browning over all or most of the crown (Figs 1 and 2). When the outer bark is cut away from the base of infected trees discoloured phloem (inner bark) is revealed (Fig 3). It is usually orange-brown in colour (Fig 3) whereas healthy phloem is white (Fig 4). Thus a distinct colour difference between infected and healthy tissue at the extending margin of the lesion is visible (Fig 3). Often, infected phloem has resin pockets, and a diffuse yellow colouration is sometimes visible in the healthy phloem in advance of the lesion margin (Fig 3).

Phytophthora austrocedrae on juniper Factsheet

Scattered dieback of shoots or individual branches of juniper may also be observed (Fig 5a). Again, cutting away outer bark at the base of affected shoots and branches may reveal orange-brown infected phloem (Fig 5b).



Figure 2: Juniper infected with *Phytophthora austrocedrae* at the stem base.



Figure 3: Basal lesions on juniper infected with *Phytophthora austrocedrae*. Outer bark has been cut away to reveal diseased phloem. H indicates healthy phloem; D indicates infected; LD indicates live-dead junction with tongue of infection extending into the healthy tissue. Box indicates good section for sampling.



Figure 4: Outer bark has been cut away to reveal healthy white phloem of juniper.



Figure 5: Juniper with dieback of a single branch (a), and aerial branch lesion caused by *Phytophthora austrocedrae* (b).

Collecting samples of juniper for diagnosis

- Phloem (inner bark) samples are used for diagnosis purposes. Sample from a tree that is in the early to mid stages of decline. Trees that are already dead with dead, bronzed foliage do not make suitable samples as the inner bark is invariably too dry to yield *P. austrocedrae* on isolation.
- Use a sharp knife to cut away the outer bark at the base of the main stem and upper roots of an affected tree, exposing the phloem (inner bark). Look for signs of browning in the phloem which indicates phloem killing and possible infection by *P. austrocedrae*.
- If an aerial infection is suspected, cut away the outer bark at the base of affected branches to look for diseased, discoloured phloem.
- Live, healthy phloem is white in colour, whereas diseased phloem is dull orange-brown (see Figs 3, 4 and 5b). If the phloem is infected, then work outwards gradually removing bark until revealing the transition between infected and healthy phloem, ie where the orange brown phloem meets the healthy white phloem. This is known as the live-dead junction (see Figs 3 and 5b). With *P. austrocedrae* the live-dead junction will often be seen as an area of healthy phloem with 'tongues' or strips of infected tissue extending into it (Fig 3).
- If diseased phloem is found, cut away several sections of phloem, each about 5-10 cm², cutting down to the wood underneath the phloem. Make sure the sample contains the live-dead junction. Always sterilize cutting tools after working on each individual tree.
- Put samples in a sealable plastic bag (eg. a freezer bag) and label with location, date and contact details.
- Send samples **immediately** by first class post. Avoid posting on a Friday.

Depending on the location of the affected trees, send samples (marked "P. aust." on the outside of the package) to:

Samples from north of the Mersey/Humber line go to:

Disease Diagnostic Advisory Service,
Forest Research,
Northern Research Station,
Roslin, Midlothian,
EH25 9SY.

Tel: 0131 445 2176

e-mail: ddas.nrs@forestry.gsi.gov.uk

Samples from south of the Mersey/Humber line go to:

Disease Diagnostic Advisory Service,
Forest Research,
Alice Holt Lodge,
Farnham, Surrey,
GU10 4LH.

Tel: 01420 23000

e-mail: ddas.ah@forestry.gsi.gov.uk