

Sirococcus blight

Summary

Since late 2013 severe shoot blight and defoliation of Atlantic cedar has been reported from a range of locations in Britain. Forest Research's Tree Health Diagnostic and Advisory Service (THDAS) identified the fungus *Sirococcus tsugae* as being consistently associated with these symptoms.

Sirococcus

Until recently, the fungus responsible for dieback of cedar in Britain would have been regarded as belonging to the species *Sirococcus conigenus* (syn *Sirococcus strobilinus*). However, research published in 2008 revealed that *S. conigenus* consisted of a group of closely related species as follows:

S. conigenus sensu stricto occurring in Europe and North America with many conifer hosts throughout the northern hemisphere. It was first described on Norway spruce in Central Europe in 1890 and has subsequently been reported on a wide range of conifers, mainly in the genera *Picea*, *Pinus*, *Larix* and *Cedrus*. It can also affect Douglas-fir (*Pseudotsuga menziesii*). There have been reports from Morocco and North Africa. This is a well-known pathogen in nurseries but can also occur in young plantations and mature stands.

S. tsugae previously only recorded in North America where it occurs on three species of *Tsuga* and two species of *Cedrus*. *Sirococcus* shoot blight of western hemlock was originally described from British Columbia and Alaska, with specimens now known to belong to *S. tsugae* having been collected as early as 1966.

S. piceicola, known to occur on *P. abies*, *P. glauca* and *P. sitchensis* and reported from Canada and Switzerland.

Distribution and susceptible species

Sirococcus tsugae has been confirmed in the USA on Atlas cedar (*Cedrus atlantica*) and Deodar cedar (*C. deodara*); also in Eastern hemlock (*Tsuga canadensis*), western hemlock (*T. heterophylla*) and on mountain hemlock (*T. mertensiana*). It is reported that *S. tsugae* appears to be less aggressive on *T. canadensis* than on *T. heterophylla*.

In 2014, the pathogen was reported from Germany where it was found in two locations on *C. atlantica* (EPPO Reporting Service 2015 no.4).

Since the first report on *C. atlantica* in England, *S. tsugae* has been detected at several locations in England, Scotland and Wales. Furthermore, it has also been confirmed as

Sirococcus blight

being present on a herbarium specimen of *T. mertensiana* collected in Scotland in 2004 and on young *T. heterophylla* regeneration in south west England.

How it spreads

The conidia of the fungus are locally dispersed by rain splash and it is probable that strong winds can disperse them over longer distances. Seed transmission has been reported for *S. conigenus*, but there is no information about whether this has the potential to occur *S. tsugae*.

Planting stock, possibly also cut foliage and seeds of *Cedrus* and *Tsuga* species from countries where *S. tsugae* occurs could be a source of the pathogen.

Symptoms

Cedrus has needles arranged spirally on the young leading shoots, and in whorls on short spur-like side-shoots. In the spring, affected trees display dead needles on the shoots, dead shoots (Figure 1a), cankers (Figure 1b) and gum exudation. The dead needles are very distinctive as they have a characteristic 'pink' colour (Figure 1c) and only become brown as the season progresses. The fruiting bodies of *S. tsugae* may be observed on the dead needles (Figure 1d).



Figures 1a-d. Symptoms on *Cedrus atlantica*

Sirococcus blight

Affected branches can display cankers but these are often indistinct and characterised by a slight reduction in branch diameter together with a change of bark colour from green to a darker red / purple (Figure 2a). The fruiting bodies of *S. tsugae* may be seen on the surfaces of cankers during the winter months and into the spring (Figure 2b).



Figure 2. A canker on *C. atlantica* (a), and close-up of the fruiting bodies (b)

Resin bleeding from the bark can also accompany these symptoms in some cases (Figure 3a). Branches can die if they are girdled (Figure 3b).



Figure 3. Resinosis (a) and branch dieback (b) on *C. atlantica*

Sirococcus blight

Lesions are evident in the phloem tissue of the bark (Figure 4a) and may extend from affected shoots into the subtending branches and the main stem, where they can spread longitudinally (Figure 4b).



Figures 4a, b. Lesions in phloem of *C. atlantica*

On western hemlock (*T. heterophylla*) the disease is especially apparent in natural stands on advanced regeneration in the understorey. It can affect one or many shoot tips on a single tree (Figure 5a). On *T. mertensiana* the fungus causes shoot blight (Figure 5b).



Figure 5. Symptoms on *Tsuga heterophylla* (a) and *T. mertensiana* (b)

Sirococcus blight

Impact

Cedrus and *Tsuga* species are valuable ornamental and forestry species in UK. Although much uncertainty remains concerning the geographical distribution of biology and potential impact *S. tsugae* in Britain, it might cause considerable damage to valuable ornamental trees in public and private gardens and economic losses, in particular for the nursery sector.

Treatment

No effective control measures against *S. tsugae* in forest stands have been reported from North America to date, and information about possible control methods in nurseries or in parks and gardens is scarce (mainly hygiene methods).

Status

Sirococcus tsugae has been added to the Alert List of the European & Mediterranean Plant Protection Organization (EPPO)

(http://www.eppo.int/QUARANTINE/Alert_List/fungi/Sirococcus_tsugae.htm).

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