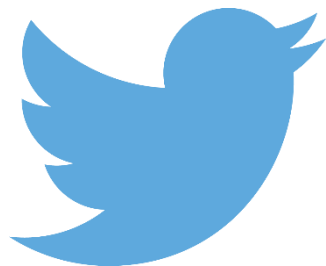




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# 'Ash Tree Armageddon'



## Have we been here before?

- **Dutch Elm Disease ( DED)** - infamous tree disease has killed millions of elm trees in the UK over the last 40 years. It's changed parts of our landscape forever and it's still spreading north.
- Caused by the fungus *Ophiostoma novo-ulmi* which is spread by the elm bark beetle. As the beetles feed, the spores are introduced into the xylem (channels for water and nutrients) of the healthy tree, releasing toxins and causing the vessels to block and the tree to wilt and die.
- DED killed tens of million of UK elm trees since 1970's. It has also devastated populations in mainland Europe and North America
- Dutch elm disease was accidentally imported into the UK from Canada in the late 1960s. It spread quickly, reaching Scotland in just 10 years.
- Spread of the disease can be slowed with sanitary felling of dead and dying trees which removes the habitat of the beetles which carry the fungus
- Despite the vast number of elms killed by DED, they have shown themselves to be highly resilient.
- Some estimates suggest there are more elms in the countryside now than there were before the current epidemic took hold in the 1970s, although few of the mature elms from that time still survive.



# The differences between DED and Ash Dieback

- Elms are allowed to grow to a certain stage of maturity before they become attractive to the bark beetle. Their skeletal remains still have many roots that grow new shoots and are able to regenerate until once again they become attractive to the bark beetle.
- Ash trees are attacked by the fungus *Hymenoscyphus fraxineus* which attacks the leaves reducing the trees ability to produce food and sugars vital for growth. The spores are airborne and areas can become awash with huge spore loads. The toxins produced by the fungi spread down the trees branches killing the bark and buds.
- Therefore whereas the elm can have many seasons before it becomes infected, the ash saplings are killed at all ages, particularly the younger trees. Older trees with higher food stores can last longer but are likely to die once these food stores are depleted.
- Some isolated ash trees may survive where spore loads are low but those most commonly in groups or in woodlands are more at risk.
- It is estimated that because of the way the disease is spread, ash dieback is 6x more deadly than DED.
- Approximately 60 million ash trees growing outside woodlands, and an estimated two billion ash trees overall including all saplings and seedlings are believed to be infected at the current time, and this is only likely to increase.



# Where and when did it all begin?

- Ash dieback is a fungus which is thought to have originated in Asia, possibly Japan.
- It doesn't cause much damage on its native hosts of the Manchurian ash and the Chinese ash in its native range.
- Introduced into Europe about 30 years ago and has devastated the European ash (*Fraxinus excelsior*) because our native ash species did not evolve with the fungus and this means it has no natural defence against it.
- The fungus overwinters in leaf litter on the ground, particularly on ash leaf stalks. It produces small white fruiting bodies between July and October which release spores into the surrounding atmosphere.
- These spores can blow tens of miles away, where they land on leaves, stick to and then penetrate into the leaf and beyond. The fungus then grows inside the tree, eventually blocking its water transport systems, causing it to die.
- The tree can fight back, but year-on-year infections will eventually kill it and whilst ash dieback is certainly capable of killing trees in its own right, in many cases the weakened tree is colonised by another pathogen, particularly honey fungus, which then accelerates the decline and death of the tree.
- In the UK, ash dieback has had the most impact in the south-east of England. This is where it was first recorded in the UK back in 2012. It is unknown how long the fungus was in the area before the symptoms became apparent, perhaps some years.
- The spores of this fungus can travel in the wind so it is possible that it arrived in the UK naturally, as the density of wider environment infections is still greatest in the east, however it is likely that it was also inadvertently imported on ash saplings, spreading from areas of new planting via wind to mature trees.

# What will be the impacts of Ash Dieback?

- It is thought we will lose around 80% of our ash trees (estimates vary between 60% - 95%).
- The loss will have a devastating impact on the landscape and biodiversity as well as connectivity between habitats.
- The loss of ash trees threatens hundreds of species of lichens, mosses, fungi, birds and plants that depend on their survival on ash trees.
- The ash dieback epidemic is a pressing conservation challenge which has implications not only for ash as a species, but also due to the risk that devastated populations can start secondary (regional) extinctions among species dependent on ash for their habitat.
- Research suggest that tree species which would eventually replace ash would not preserve the features of the original ecosystems.
- The loss of climate change benefits, improving air quality and other ecosystem services would also be lost.
- Featureless and less distinctive landscapes. Loss and damage of non-woodland trees will have a greater impact on landscape and biodiversity than that of woodland trees.
- Impact on timber production, on firewood availability, and on the production of specialist products like tool handles. Employment and the rural economy will be affected.



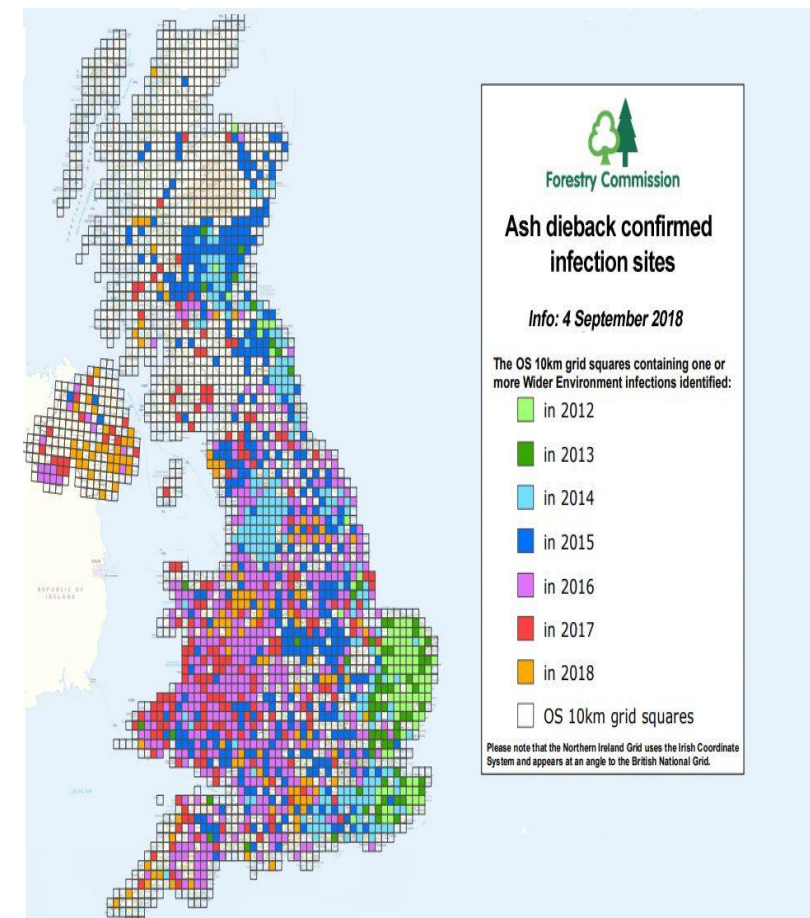
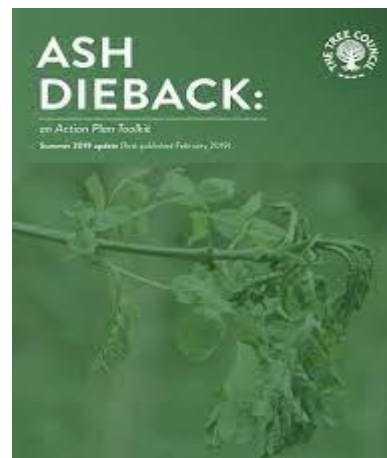
# Is there any natural disease tolerance?

- There is hope on the horizon. Initial findings suggest that we might have some trees that are tolerant to ash dieback, meaning that the population could eventually recover over time (likely over 50 years).
- However, tolerance to the disease is complicated because a number of factors play into it including genetic traits, the health of the tree and the number of ash dieback spores in the atmosphere.
- Research has also shown Danish ash trees that show more resistance to the fungus, seem to produce fewer chemicals protecting them against insects, such as the alien species emerald ash borer – a beetle that can kill ash forests a lot faster than the ash dieback disease.
- Isolated ash trees or those in open canopies tended to have higher crown temperatures than those in shaded forests. This is less favourable for the development of the fungal pathogen that causes ash dieback, with climate change increasing temperatures above 35 degrees this may be one positive aspect of warmer temperatures.
- The challenge now is to identify pathways to breed trees with genes for resistance to both the insect and the ash dieback.



## So, are we looking at mass extinction of the UK's Ash Trees?

- Develop Plans to manage ash die back including tree resilience strategy.
- Identify locations affected by ash dieback so you know the scale of the problem.
- Ensure all stakeholders are aware of the problem and resources are identified.
- Try to prevent the **local spread** of ash dieback by collecting the fallen ash leaves and burning, burying or deep composting them. This disrupts the fungus's lifecycle.
- Preserve and promote ash trees that show none or little symptoms, which are likely to be resistant to the disease and that may be able to transmit this trait to their descendants.
- When replacing lost trees ensure provenance of saplings/trees and try to plant native species.
- **Keep up to date with the latest information.**







# APSE Ash Dieback Survey Report

<https://apse.org.uk/sites/apse/assets/22-23%20Ash%20Dieback%20Survey%20Results%202022.pdf>

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