

# Science for Environment Policy

## Tree breeding programme to fight ash dieback recommended by study

**A recent study** confirms that some European ash trees are more genetically-resistant to the devastating ash dieback disease. These individuals could therefore be selected for gene conservation and/or start a breeding programme to save the European ash.

**Ash trees (*Fraxinus excelsior* L.)** across Europe are dying from a newly recognised fungal infection, *Chalara fraxinea* T. Kowalski. First observed in Lithuania and eastern Poland in the mid-1990s, the disease has spread in all directions into Latvia, Russia, the Czech Republic, Germany, Austria, Hungary, Slovenia, Belgium, France, Sweden, Denmark, Norway, Finland and, very recently, the UK. Its effects can be drastic; in Lithuania, for example, the disease caused the forested area of ash to fall from 53,000 to 38,000 hectares between 2001 and 2009.

The dieback-causing fungus is able to attack many different parts of the ash tree, and can affect leaves, shoots, stems, buds and bark. However, healthy, resistant trees have been found in heavily-infected natural stands of ash, suggesting that underlying genetic factors may play a role in the trees' risk of being affected by the disease.

Over five years (2006-2011), ash trees of age 16-22 years were studied in two seed orchards planted in southern Sweden. The trees had been cloned from 100 healthy individuals taken from 27 stands of ash trees growing naturally in the region before the appearance of ash dieback disease. Resistance of the trees to the disease was evaluated by observing the damage to the crown and stem, attributed to infection by *C. fraxinea*.

No trees were entirely disease free, but some individual trees were more resistant than others, exhibiting much less damage and higher growth. The resistance was maintained even after six years of heavy infection pressure. The results indicate that some individual trees are more genetically resistant to the effects of the fungal infection.

These findings support those from separate studies conducted in Denmark<sup>1</sup> and Lithuania<sup>2</sup>, which also observed a significant amount of variation in the damage caused by ash dieback and pointed to a strong genetically-determined susceptibility to the disease among trees. This study suggests it might be that trees that were less damaged were faster growing and more vigorous, probably because trees that grow fast have some degree of resistance and are therefore generally healthier. It may also be that the healthier, fast-growing trees restrained the spread of the fungus.

Together, these studies suggest that breeding ash trees from more healthy individuals could form the basis of a European regeneration programme. To capture the widest range of genetic variation, it is suggested that clones are obtained from resistant trees found in many countries across Europe. Given the alarming effects of the disease, the researchers recommend that appropriate measures should be taken as soon as possible to support a selection of healthy trees to be used for gene conservation, production of ash material of higher vitality and/or to further improve resistance by breeding.

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