

# Living Ash Project

## Finding Ash trees tolerant to Ash Dieback

*by Jo Clark*

News about Ash dieback has gone rather quiet in the media with newer threats on the horizon such as *Xylella* (which attacks a number of woody hosts, most notably for British forestry Oak and Cherry species but also Elm and Plane), Chestnut Blight, Emerald Ash Borer and the ongoing suite of problems affecting Oak trees. However, research on Ash dieback continues, and this coming winter will see the establishment of an archive of putatively tolerant trees on the public forest estate in Hampshire.

Ash dieback is caused by a non-native fungal pathogen – *Hymenoscyphus fraxineus* – which was confirmed in the UK in 2012, although recent research has shown it to be present in Britain at least eight years prior to this<sup>1</sup>. The disease originates from East Asia, where it co-exists with native Ash species e.g. *Fraxinus mandshurica*, but it is highly virulent on European Ash species *Fraxinus excelsior* and Narrow Leaved Ash – *F. angustifolia*, although somewhat less virulent on the Manna Ash, *F. ornus*. However, unlike Elm, a few clones of which were introduced by the Romans as vine props, Ash is genetically diverse. It is this genetic diversity which gives us hope that Ash will survive and remain a viable option as a timber species in the future.

In 2013 Defra awarded funding to a consortium of researchers to identify trees tolerant to Ash dieback. Led by Earth Trust, the Living Ash Project is visually screening 40,000 trees that were already in research trials and seed orchards prior to the arrival of Ash dieback to identify those individuals that show tolerance. We have also been using citizen science to engage the public to monitor trees in the wider environment. During summer 2017, when it is easier to spot signs of dieback, we visited over 75 estates where Ash is an important component of the woodlands. These estates contributed Ash trees of superior phenotype to the Future Trees Trust's breeding programme in the 1990s. Even though the original selected tree may be



*Ash crowns showing various degrees of dieback*

infected, other trees in these top quality stands could yield tolerant individuals, important if we are to keep Ash as a timber species.

We also visited woodlands identified through citizen science and by woodland managers and FC tree health officers. Norfolk Wildlife Trust and the Woodland Trust were particularly helpful in this regard, as Ash dieback was already severely impacting woodlands in Norfolk and Suffolk. Besides East Anglia, the area most badly impacted by Ash dieback at present is Yorkshire – somewhat of a surprise as Ash dieback was only really first noticed to any extent in 2016. A year later, and the inroads the disease has made were startling although perhaps less surprising given the abundance of Ash in Yorkshire, and its role as the prime species in hedgerows and along transport corridors.

Having identified putatively tolerant trees during summer 2017, we collected graftwood from 412 of these trees in January 2018 which was sent under license from Fera to East Malling Research in Kent. Because of the ban on moving or planting Ash, no nursery is raising Ash plants for rootstocks, so we had to have these contract grown. Ideally a rootstock should be a two-year-old plant of pencil thickness to maximise successful grafting. However, our rootstocks were only one year old, and so were rather



*Collecting Ash graftwood in January 2018 at Ashwellthorpe Wood, courtesy of Norfolk Wildlife Trust*

skinny. This meant that the scion material also had to be skinny to enable the grafters to match up the cambium of rootstock and scion. This resulted in very small grafts, but these will have the best possible care, and be well looked after in glasshouses to maximise growth.

Researchers in Denmark also identified a correlation between early senescence (leaf fall) and tolerance. We have assessed many thousands of trees for both timing of budburst and senescence and scored them for infection and found the same correlation. This offers a mechanism for selecting which trees to retain if early intervention is desired before the effects of Ash dieback are apparent.

Another element of the Living Ash Project is to assess the level of heritance of tolerance which offers hope of breeding tolerant trees. Forest Research established three progeny trials in 2015 in areas of high infection. These have been assessed twice now and show varying degrees of tolerance. A couple more years is needed for impacts of



*Grafts of putatively tolerant Ash trees at East Malling Research*

the disease to be felt across the whole trial (rather than potentially patchy by chance) before we can calculate reasonably accurately how tolerant these families are. Forest Research are also developing tissue culture techniques for Ash, so that any tolerant trees identified can be bulked up for use in future research or reforestation purposes.

Finally, a brief word about Emerald Ash Borer (EAB). This is a very beautiful *Agrilus* beetle native in Asia as is the Ash dieback pathogen. It has caused enormous damage in the eastern United States, killing many millions of trees. Currently found just west of Moscow, it is working its way westwards at approximately 20km a year – assuming it doesn't catch a ride on a freight train. Researchers at the University of Exeter are working on metabolites of Ash that make the timber less palatable to the beetle. The archive material of Chalara tolerant Ash will be made available to other researchers.

Although funding for the Living Ash Project ends later this year, project partners will continue to monitor the archive to quantify the degree of tolerance in selections, remove less tolerant individuals and add to the archive numbers as better trees are identified as nature continues to screen Ash across the country. It will be many years yet before we have seed available for reforestation purposes.

*1 Wylder et al. 2018. Evidence from mortality dating of *Fraxinus excelsior* indicates Ash dieback (*Hymenoscyphus fraxineus*) was active in England from 2004-2005. Forestry 00: 1-10.*