Research into Acute Oak Decline (AOD)

Rookery Wood at Attingham Park was one of eight locations in England where detailed studies of this disease has been going on since 2008. This coincided with the start of my volunteering there and very soon I was asked to survey the other areas of the estate for the disease in case it had spread beyond Rookery Wood, which it had. Those members who have joined my tour of Attingham's notable trees will have heard about AOD already but for those who have not, the presence of the disease on oaks alone is shown by black tarry exudates from between the bark plates usually in the lowest three meters of the stem and in almost all instances these bleeds are found to be associated with larval galleries of the Jewel beetle (*Agrilus biguttatis*) just below the bark although the insect has not yet been shown to be the vector for the disease. Only in severe attacks of the disease does it prove fatal to the tree but in the majority of instances the tree sets up a defence mechanism by surrounding the larvae in callus wood, often so successfully that after four to five years it is difficult to see that the disease had been present.

The symptoms of the disease have been known in continental Europe for decades but as fatalities were low little research into the cause was undertaken. It was only when its presence including fatalities became widely reported in England in 2006 onwards that detailed studies began. Since then an extremely impressive research programme involving both public and private funding has been set up. Large amounts of private funding has come from the Woodland Heritage and public funding from DEFRA and Forest Research. To celebrate the 10th year of the project, which has produced some very interesting and important findings a conference was recently held at which the scientists and public stake-holders met to discuss the progress. Having been involved with the programme for so long (latterly as a lead Volunteer in the ObservaTree project) I was lucky enough to be invited to attend the conference and in the absence of Bob Thurston from Attingham I represented that National Trust property.

Seventeen papers were presented by researchers from twelve institutes from all over England and Wales. I will not attempt to cover them all but will mention some of the more interesting results.

- At least two of six newly named bacteria have been found in the tarry exudates that typify AOD (two of them named for old colleagues of mine in Forest Research)
- Trees with AOD symptoms have been shown to have grown more slowly than healthy trees even before the symptoms were observed.
- Four volatile products that attract the Agrilus beetles have been isolated from symptomatic trees
- AOD has not been found north of a line from the Mersey to the Humber and west of the Marches except south of Worcester. (It is widespread in all areas south and east of these lines and now is found as far west as Devon)
- The mycorrhiza in the soil around infected trees differs from that around asymptomatic trees.

Two other papers excited me more than the above work because of my volunteer work for the Ancient Tree Inventory (ATI) .

In some of the above studies it has been necessary to take samples of oak roots. But in almost all oak woods in the UK oaks are growing in close proximity to other trees. Roots intermix over many metres and sometimes even fuse together irrespective of species. It was therefore necessary to devise a technique for differentiating between the roots of the woodland species. A quick colorometric test has been devised which not only differentiates between oaks and other species but also between species of oaks.

In another study trying to see if there is a genetic difference between symptomatic and non-symptomatic oaks the DNA of these and of different oak species were sequenced. They have already sequenced 400 oak trees (many oaks at Attingham included) and have found significant differences between the genomes of pedunculate and sessile oaks as well as hybrids between the two. It appears that there is a quick diagnostic test that potentially could be carried out in the field."

For over 100 years there has been an argument between British dendrologists as to whether and how much hybridisation between Quercus robur and Q petraea takes place in the UK. Even some of the current most eminent UK dendrologists do not accept that it occurs very often. If these tests can indeed be refined so that they can be used in the field, quickly and cheaply, it would make the job of the ATI verifier much more accurate.

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