

Acute oak decline (AOD)

Over the past 3-4 years there have been a growing number of reports of a disorder known as Acute Oak Decline. Both native species of oak (*Quercus robur* and *Q. petraea*) are affected, mostly in the form of mature trees >50 years old. Typical symptoms include extensive stem bleeding where fluid exudes from bark cracks and stains the tree trunk. Trees with advanced levels of bleeding also have crown symptoms (dieback and yellow, thinning foliage). 'D'-shaped beetle exit holes are sometimes present on tree stems, a sign of breeding activity of *Agrilus biguttatus*. Some trees die within 4 to 5 years of the onset of symptoms. Mortality is not unusual.



Research evidence has revealed

- AOD is most prevalent in the Midlands and south east England. Over 150 sites have been recorded and on average 25% of trees at each site show typical symptoms.
- Records show there is 10% increase in symptomatic trees p.a. and 1% of those trees die each year.
- AOD incidence in the UK is unquantified; estimates put the number of trees currently affected at 3,000 to 10,000.
- Insect attack is often associated with the stem bleeding, particularly by the oak buprestid beetle *Agrilus biguttatus*. These beetles are not considered the cause of AOD, but attack the weakened trees and may hasten their death.
- Lesions and cavities are found in the bark around stem bleeds, *Agrilus* galleries traverse- or are associated with lesions.
- Previously unknown species of bacteria, some now named, are thought to play a role in AOD and tests are underway to characterise them and confirm their roles.
- A similar condition, apparently involving some of the same *taxa* of bacteria, has been reported on Mediterranean oaks in Spain.
- The within site spatial patterns of affected trees indicate a clustering pattern suggesting localised spread on AOD sites.

Known evidence gaps

- Rapid diagnostic methods and investigation of the genetic and biochemical regulation of infection and host response.
- An understanding of the interplay between host trees, bacteria and *Agrilus* beetles.
- Analysis of AOD spread within and between sites, including possible vectors, as well as the incidence of the disorder throughout GB.
- Site/spatial aspects of AOD including distribution patterns, association with site factors and silvicultural practice.
- Time frame for symptom development and prognosis for affected trees.
- Development of best management practice including an assessment of the utility of affected oak timber, sanitation, disposal of felled material, bark and lop and top, stump treatment.

Potential impact

Oak comprises 23% of the broadleaf area in Britain (223,000 ha). Apart from timber values, estimates of the biodiversity and carbon sequestration values of oak exceed £750m/annum, landscape and recreation value exceed £240m/annum. At losses of 1-5% through tree death each year, extended over much of England could lead to the loss of millions of trees over a ten year period. Increased populations oak buprestid beetles and pinhole borers appear to be associated with AOD, and also reduce the salvage timber value of affected trees.