



Arboriculture Research Note

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Occurrence of Decline and Dieback of Oak in Great Britain By BJW Greig, Pathology Branch, Forestry Commission

Summary

This Note reviews previous occurrences of oak dieback of Britain and Europe. Investigations of woodlands and parkland oak trees exhibiting dieback have failed to identify the cause but climatic conditions appear contributory. The current status of the condition and management implications are considered.

Introduction

1. Over the past decade there have been many reports of death and dieback of oaks (*Quercus robur* and *Q. petraea*) spp.) in various European countries. In Britain only a few such cases had been reported prior to 1988, but in 1989 the Forestry Commission Pathology Branch received several enquiries about dieback in woodland and parkland oak. In 1990 an investigation into the problem was started. This Note is a preliminary report of current knowledge about the condition.

Oak decline in Europe

2. At an EPPO¹ meeting held in Hungary in 1989, significant oak decline in the 1980s was reported from Austria, Czechoslovakia, Federal Republic of Germany, Hungary, Italy, Netherlands, Poland and Yugoslavia. In France the main recent period of major decline was in the late 1970s (Anon 1990). In most countries, water stress due to the severe droughts of the 1980s was considered to be the main cause. This may predispose trees to attack by various pests such as honey fungus (*Armillaria* spp.) and certain insects.
3. In parts of eastern Europe, especially in the USSR and Romania, the oak decline has been attributed by some to a 'vascular wilt' type of disease involving various fungi in the *Ophiostoma* (formerly known as *Ceratocystis*) group. However doubts exist about this attribution and in Western Europe fungi on this genus are not considered important. In other reports winter frosts and air pollution have also been cited as contributing to the decline.

History of oak dieback in Britain

4. In the early 1920s considerable mortality occurred among oaks in southern England. This was thought to be due to several years of defoliation by the Oak leaf roller moth caterpillars (*Tortix viridana*), attacks of Oak mildew (*Microsphaera alphitoides*) and root infection by honey fungus (Jones, 1959). There are no reports of oak decline after 1927 until 1958 when death of young oak occurred in several woods in Norfolk. After investigation it was postulated that the damage was initiated by the combined effects of drought and persistent northerly winds in July 1955. The continuing deterioration of these trees was probably caused by defoliating insects and oak mildew in the following years (Young, 1965).

1. European Plant Protection Organisation

5. The next cases to be reported were in 1982 at Chiddingfold, Surrey, and from the Forest of Dean in 1985. At Chiddingfold the damage was attributed to several years of severe defoliation by caterpillars, Oak mildew on the epicormic shoots and subsequent invasion of the weakened trees by honey fungus. In the Forest of Dean, no apparent cause could be found for the dieback and death of the trees. Both sites were inspected again in 1990 and although there were many standing, long dead trees, the surviving trees were in good condition and a few of the affected trees had recovered. In both cases it seemed there had been a period of 2-3 years during which trees had declined and died.
6. The Sessile oak in Wyre Forest, West Midlands, has over many years, suffered from an unusual dieback in which small branches wilt and die suddenly in mid summer. Heavy infestation by the scale insect *Kermes quercus* occurs on many of the affected trees and there is evidence that bark colonising fungi such as *Sphaeropsis* sp. Also played a part in the problem. In 1985 it was estimated that 18% of the trees in the Forest were significantly affected by dieback.
7. Two recent surveys into tree condition have provided some more information on the health of oak in Britain. First, a survey of non-woodland ash (*Fraxinus excelsior*) and oak in 1987 found that 18% of the oak showed more than 10% crown dieback, with East Anglia, the South Midlands and south-east England being the worst affected areas (Hill & Gibbs 1991). Here the causes may well be related to agricultural practices. Second, data are available on the condition of oak in 77 plots covered by the Forestry Commission's Forest Monitoring programme. Crown density scores improved between 1989 and 1990, but deteriorated in 1991- some individual trees showed a marked decline although others showed a degree of recovery (Innes and Boswell 1991 (a) & (b)).

Typical symptoms of dieback and decline

8. The first symptom usually to be observed on a declining tree is an overall deterioration of the foliage. The leaves, which are often smaller than normal, are pale green or yellow and may be rather sparse. Subsequently, dieback of fine twigs may occur leading to death of small branches, by which stage the foliage is very sparse. Eventually most of the large branches may die back so that only the trunk and a few branches remain alive. Epicormic shoots may develop in tufts on these remaining branches and on the stem. Even at this late stage of decline the roots are normally still alive. The whole process can occur over 2-3 years, although some trees remain in the final stage for several years and, of these, a proportion can recover. In the final stage of decline various insects may attack the tree. These include the Buprestid beetle (*Agilus pannonicus*) the Oak bark beetle (*Scolytus intricatus*), and various longhorn beetles.

The current situation

9. There are about 30 known sites in the southern half of England where oak decline is causing concern. These are mostly in the east Midlands but they are to be found as far apart as Devon and Kent. The trees range from 40 to 200 years old and occur on a range of soil types. About half are in woodlands and the remainder in parkland. The symptomatology of the declining trees on a number of sites have indicated that the radial growth started to decline around 1984/5 and that annual ring growth was very small in the following years.

Causes of the decline

10. At present a variety of factors appear to be involved in the decline syndrome but the same factors may not be involved on each site. The onset of growth decline in the mid eighties suggests that droughts in the summers of 1983/4 or the severe winters of 1984/5/6 may have acted as a trigger for the problem. The role of defoliating caterpillars such as those of the Oak leaf roller moth and the Winter moth (*Operophtera brumata*), is unclear. Recent years have not been marked by serious outbreaks of these insects. On some sites the trees appear to be suffering from lime-induced chlorosis.
11. There is no evidence at present that root damage is a major factor. The root systems of ten affected trees with extensive crown dieback were excavated on three sites and even the very fine roots were found to be alive. Although a few declining trees elsewhere have been found with extensive root-rot caused by Honey fungus, or rarely *Collybia fusipes*, these fungi are not considered to be of major importance.

12. No evidence of a vascular wilt disease similar to Dutch elm disease has been found. Leaves from severely affected trees, with conspicuous yellow foliage, were tested at the Rothamsted Experimental Station for viruses and related pathogens with negative results.

Prognosis and management of affected trees

13. Previous outbreaks of oak dieback in Britain have involved isolated episodes with subsequent periods of recovery. It is too early to say if this will happen again. Plots of individual trees will be assessed annually to monitor the situation. In the last two years oak was in generally good condition, attacks by defoliating insects were light and many foresters remarked that their oak woods were looking remarkably green and healthy.
14. Current advice to owners with an oak dieback problem is that severely affected trees seem unlikely to recover. It may be prudent to restrict thinning in affected woodlands to the removal of such trees until it becomes clear whether or not a cyclical phenomenon (such as has occurred in the past) is involved.
15. Parkland trees can be left standing until dead, unless public safety is a consideration. Dead trees should be felled and the timber can be utilised. Some of the dead wood could be left on the ground to provide an important wildlife habitat.
16. There is no evidence to suggest that oaks planted into affected sites will suffer a similar fate.

This Arboriculture Research Note is largely based on a paper 'Oak decline in Britain' presented at the National Hardwoods Programme at the Oxford Forestry Institute in October 1991.

References

- Anon., (1990). Oak decline and the status of *Ophiostoma* spp. on oak in Europe. *Bulletin OEPP/EPPO Bulletin* 20, pp 405-422.
- HULL, S.K. and GIBBS, J.N. (1991) Ash Dieback. A survey of Non-Woodland Trees. *Forestry Commission Bulletin* 93, HMSO London.
- INNES, J.L. and BOSWELL, R.C. (1991a). Monitoring of Forest Condition in Great Britain 1990. *Forestry Commission Bulletin* 98, HMSO London.
- INNES, J.L. and BOSWELL, R.C. (1991b). Forest Monitoring Programme 1991 results. *Forestry Commission Research Information Note* 209.
- JONES, E.W. (1959). Biological Flora of the British Isles. *Quercus* L. *Journal of Ecology* 47, pp 169-211.
- YOUNG, C.W.T. (1965). Death of Pedunculate oak and Variations in Annual Radial Increments Related to Climate. *Forest Record no.55*, Forestry Commission. HMSO London.

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