

## PHYTOPHTHORA ROOT DISEASE OF COMMON ALDER, by John Gibbs

---

### Summary

Recent studies have shown that a Phytophthora root disease of common alder is widespread in southern Britain and that thousands of trees are affected. The current situation is outlined.

---

### Introduction

1. Common alder (*Alnus glutinosa*) is a native tree with a great ability to tolerate wet sites. It has considerable landscape value along waterways, where in addition its root system helps to stabilise the banks. It is important in river ecology both in the riparian and aquatic environments. Grown on a coppice system in woodland it is used for the production of hardwood pulp and charcoal.
2. Concern about the health of alder in Britain was first raised in early summer 1993 by Dr G B J Dussart of Christ Church College, Canterbury (G B J Dussart *in lit.*; Anon., 1993). Phytophthora root disease was diagnosed by staff of the Forestry Authority Research Division, initially at sites in Kent and Worcestershire, and subsequently at a site in Gwent. In September 1993, a fungus in the genus *Phytophthora* was obtained from necrotic alder bark at the Worcestershire and Gwent sites. As little is known about the pathology of alder, it was not clear whether the disease was new or whether it had been long present but previously unrecognised. Further work was therefore conducted in 1994 and this Note has been produced to provide a description of the disease and some information on its behaviour.

### Symptoms of the disease

3. Symptoms are those typical of Phytophthora root disease on other broadleaved trees (see Strouts and Winter, 1994): leaves are abnormally small, yellow and sparse, and frequently fall prematurely. Dead roots can be found, and examination of the base of a stem with severe crown symptoms usually reveals the presence of strips of dead bark extending up from ground level. These are often marked externally by the production of a tarry or rusty exudate. Alder stems showing these symptoms will either die or suffer severe dieback.

### Current knowledge of disease severity

4. During 1994 a more systematic approach to the collection of data on disease distribution has been instituted following commencement of a research project funded jointly by the Forestry Authority and the National Rivers Authority. This has involved the establishment of a series of sample plots on rivers over 8 m wide in the southern half of England and in parts of east Wales. In addition, reports from the public have been followed up, many of these being generated by an item in the BBC TV programme "CountryFile" in May.
5. It is now clear that the disease is widespread in southern Britain (Figure 1). Preliminary analysis of the survey results indicates that in the sample plots approximately 5% of the alders are showing current symptoms of the disease. By extrapolation this could well amount to more than 20 000 trees in the whole survey area. Very few dead alders have been found near the currently affected ones and this lends support to the view that the disease is a new phenomenon.

6. No quantitative data are available for smaller streams or for other types of alder site. However, observations would suggest that disease levels are very much lower. There are no records for Scotland where such damage to alder as has been investigated has proved to be due to other causes.
7. It is evident that a high proportion of the trees suffering from *Phytophthora* root disease are in close proximity to streams and rivers, often being located at intervals along substantial sections of bank. The disease has also been found in plantings of alder in sites subject to flooding from adjacent rivers on the banks of which signs of infection are present. However, some instances of disease have been found on sites not liable to flooding, as for example, in an orchard shelterbelt on sloping soil far from any stream. While most of the records are from common alder, instances of disease have also been found in grey alder (*A. incana*) and Italian alder (*A. cordata*).

### **Disease biology**

8. The 'alder' *Phytophthora* is a form of *P. cambivora* (Brasier *et al.*, in preparation), a well-known pathogen which causes root and stem diseases of a wide range of tree species in this country and abroad. As yet very little is known about the biology of the alder *P. cambivora* although experiments have established its ability to invade and kill bark on the stems of common alder (Gibbs, in press). As with many other *Phytophthora* species, it produces water-borne spores and it seems certain that these are important in the infection process. A programme of detailed research is being initiated.

### **Future progress of the disease**

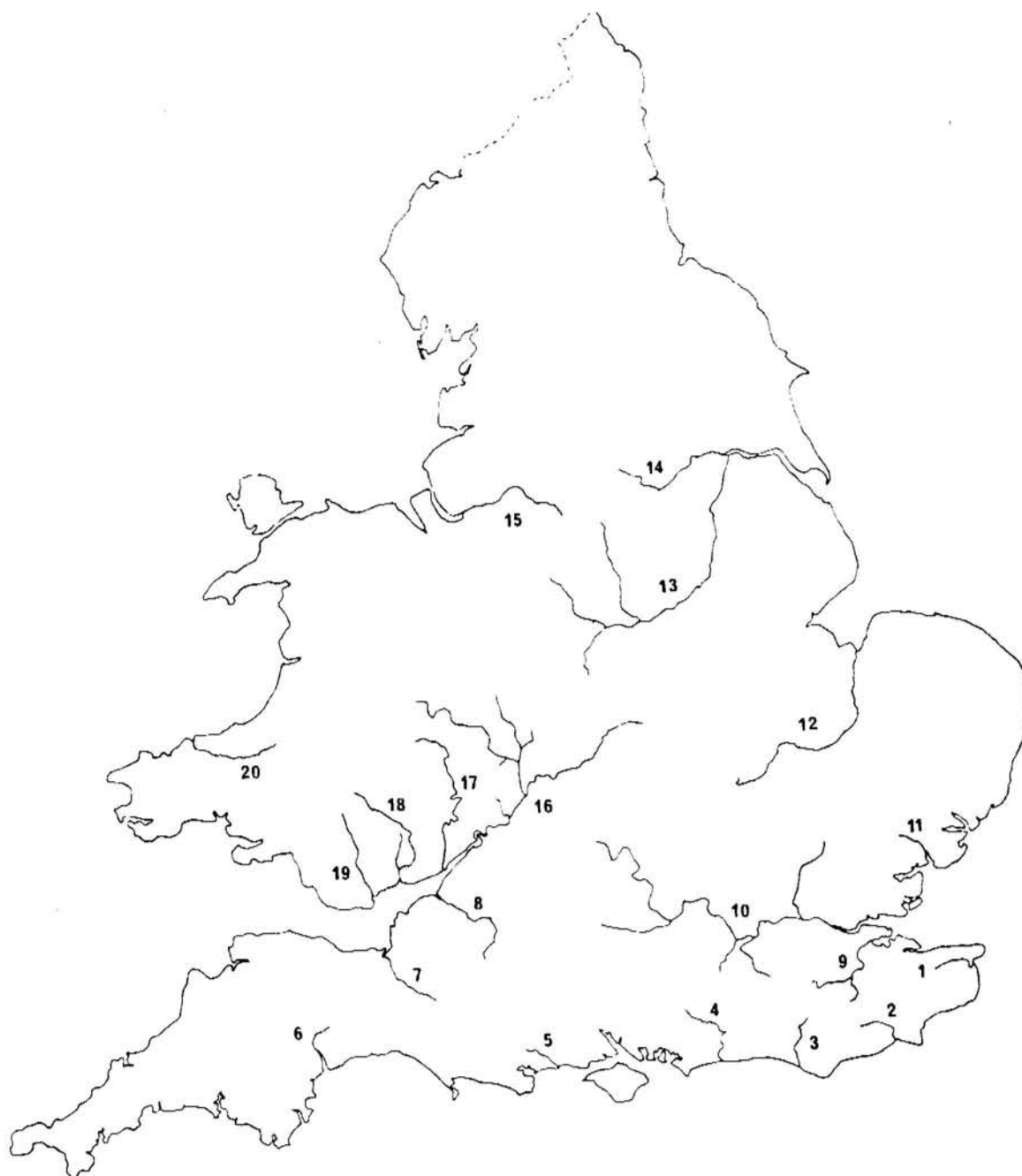
9. Any comments on future disease progress must inevitably be very tentative. Although high river and ground water levels during the 1993/94 winter may well have been particularly favourable for infection, it seems probable that the disease will develop further in future years. The survey plots established in 1994 will provide a basis for monitoring future change.

### **Possibilities for control on affected sites**

10. In none of the sites investigated so far has there been any case for attempting sanitation operations. Cutting the stems on affected root systems would not have any effect in eliminating the fungus. Stump removal would cause considerable bank erosion, and in any case, would be expected to leave significant parts of the diseased root system in the ground. Moreover, it is probable that some symptomless trees in the vicinity would have fungus-colonised roots capable of providing inoculum for further infection.
11. No chemical treatment of any kind can be recommended and indeed there seems to be no likelihood that any chemical could be found that would be suitable for use in a riparian setting. Other approaches to control must await research on the disease. For example, it is not yet known if any common alder are resistant to the disease.

### **Long distance dissemination of disease**

12. While there is now circumstantial evidence from the data on disease distribution that the fungus can be disseminated in moving water, nothing is known about other mechanisms for long distance spread. By analogy with crayfish plague, another disease present on British rivers that is caused by a water-borne fungus (see Holdich and Reeve, 1991), it seems feasible that movement of the pathogen between river catchments could be facilitated by man. Activities such as inter-basin water transfer, movement of fish stocks and the use of contaminated fishing equipment could all be important. Natural spread by wading birds, etc., also seems possible. In addition, although the disease has not been reported from nurseries, consideration of other *Phytophthora* root diseases suggests that carriage of infected plants and infested soil could be important. Investigation of the possible role of these processes is in progress.



**Figure 1.** Map of England and Wales showing rivers on which symptoms characteristic of *Phytophthora* root disease of alder have been observed.

Numbers refer to river catchments opening on to salt water. Parts of the following rivers are affected :

- |  |  |
|--|--|
| 1. Great Stour (Kent)  | 11. Colne (Essex)  |
| 2. Rother (Kent)   | 12. Great Ouse, Ouse (Cambridgeshire, Bedfordshire)                |
| 3. Ouse, Uck (East Sussex)   | 13. Trent, Derwent, Churnet, Tame (various counties)               |
| 4. Arun, Rother (West Sussex)  | 14. Don, Dearne (South Yorkshire)                                  |
| 5. Stour (Dorset)  | 15. Mersey, Goyt (Cheshire)  |
| 6. Exe, Culm (Devon)   | 16. Severn, Leadon, Avon, Teme, Clun, Salwarpe (various counties). |
| 7. Parrett, Yeo (Somerset)   | 17. Wye, Lugg, Arrow (various counties)                            |
| 8. Avon, Frome (Avon, Somerset)  | 18. Usk, Lwyd (Gwent, Powys)                                       |
| 9. Eden, Teise (Kent)  | 19. Taff, Cynon (South Glamorgan, Mid Glamorgan)                   |
| 10. Thames, Lea, Stort, Mole, Way, Kennet, Windrush (various counties) | 20. Teifi (Dyfed)  |

## The situation abroad

13. The world scientific literature includes an enormous list of trees that can suffer from *Phytophthora* root diseases. However no reference has been found to any other cases of the disease on alder. It may well be that recognition of the current situation in Britain will prompt a more detailed investigation of diseased trees in this genus elsewhere.

## References

- ANON. (1993). Alder population hit by 'mystery plague'. *Farmer's Weekly*, 18 June.
- BRASIER, C.M., ROSE, J. and GIBBS, J.N. An unusual *Phytophthora* associated with widespread alder mortality in Britain. *Plant Pathology*, in preparation.
- GIBBS, J.N. *Phytophthora* root disease of alder in Britain. *EPPO Bulletin*, in preparation.
- HOLDICH, D.M. and REEVE, I.D. (1991). Distribution of freshwater crayfish in the British Isles, with particular reference to crayfish plague, alien introductions and water quality. *Aquatic Conservation* **1**, 139-158.
- STROUTS, R.G. and WINTER, T.G. (1994). *Phytophthora* root diseases. In: *Diagnosis of ill-health in trees*. HMSO, 197-199.

---

Issued by:  
Research Publications Officer  
The Forestry Authority, Research Division  
Alice Holt Lodge, Wrecclesham  
Farnham, Surrey GU10 4LH

November 1994

© Crown copyright 1994

ISSN 0267 2375

**NOT TO BE REPRODUCED WITHOUT FORESTRY COMMISSION PERMISSION**