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## Arboriculture Research Note 58

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**PHYTOPHTHORA ROOT DISEASE, by R G Strouts, Disease Diagnostic and Advisory Service, Forestry Commission**

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### Summary

Symptoms of this common, sometimes fatal disease of ornamental trees and shrubs and conditions under which it develops are described and control measures suggested.

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### Introduction

1. Phytophthora is a common and sometimes fatal root disease of many plants, including some of our commonest ornamental trees and shrubs. Diagnosis of the disease often presents considerable difficulties: distinctive symptoms, even when present, are easily overlooked and in the field the causative fungus produces no visible structures. Furthermore, damage is sometimes mistaken for Honey fungus as this can quickly invade Phytophthora – killed roots, or for water-logging damage as the disease is closely associated with wet soil conditions. Laboratory detection of the fungus can also be difficult as by the time disease symptoms are reported, the fungus has often been replaced in killed tissues by saprophytic species (although it may still be recoverable from the soil).

### The Consequences of the Disease

2. Unlike the much more familiar Honey fungus (see Forestry Commission Bulletin 100), attacks by Phytophthora are short lived, not progressive, though they may recur. Mild attacks often pass unnoticed, but the death of a large proportion of a tree's roots, or of the stem at ground level, will lead to noticeable foliar symptoms: leaves may be abnormally small, yellow or sparse over all or part of the crown and extension growth much reduced; the crown may die back in parts, resulting in a stag-headed appearance in large trees. Plants of any size or age may be damaged or killed.

### The Cause of the Disease and its Spread

3. The disease is caused by various species of water moulds (fungi in the genus *Phytophthora*) which are readily carried in drainage and irrigation water and in infected soil adhering to plants, tools, vehicle and footwear. New outbreaks are often the result of introducing plants from infected nurseries, and in nurseries themselves may originate in contaminated irrigation water. These microscopic fungi may, however, be present on a site without causing obvious symptoms until either the local conditions change in their favour or particularly susceptible species are planted there.

## Diagnosis

4. As many other root diseases and disorders also induce foliar symptoms like those described in paragraph 2, these alone are insufficient for a positive *Phytophthora* diagnosis. If, however, the foliar symptoms are associated with dead, undecayed roots in which no fungal tissue is evident, *Phytophthora* should be considered as a possible cause, especially if the plant is of a known susceptible species. If in addition tongues of dead bark are found extending up the stem from dead roots, this diagnosis is probably correct. (It is not possible to distinguish recently killed bark from live bark without cutting into it). In some trees, notably some varieties of the very susceptible Lawson cypress (*Chamaecyparis lawsoniana*), such tongues may kill one or two lower branches and result in a characteristic dead patch of foliage on one side of the tree.
5. Patches of a gummy or watery, rusty red or blackish fluid may exude from the dead or dying stem bark, notably on alders (Gibbs 1994).

## Contributory Factors

6. The disease requires wet soil for its initiation, so is commonest on heavy, poorly drained soils, though temporary wet conditions may allow its development on normally dry sites. It is also encouraged by the presence around the tree of large quantities of decaying organic matter such as lawn mowings farmyard manure, and compost.
7. The disease occasionally occurs on a very wide range of tree and shrub species but some are notably susceptible, among which are azalea and rhododendron, apple, beech, heathers and heaths, Horse chestnut, Lawson cypress, lime, Southern beech (*Nothofagus*), Sweet chestnut (on which the disease is known as 'Ink disease') yew, eucalyptus, the flowering cherries and, as recently discovered, the alders (Gibbs, 1994).

## Control

8. In nurseries, soil sterilisation may be appropriate, but continual heavy losses in field-grown, young nursery stock are best overcome by changing to a container system with careful attention to plant hygiene and the cleanliness of irrigation water.
9. In other situations, control would normally consist in the use of relatively resistant species, attention to drainage, the avoidance of heavy applications of composts and manures, and the avoidance of unnecessarily heavy watering. However, where there is special need to persist with the growing of susceptible trees on infected sites (in a yew topiary scheme, for example or in an orchard), it would be worth considering the regular use of a fungicide based on metalaxyl or fosetyl-aluminium. For further advice, consult the manufacturers (listed in the UK Pesticide Guide, published jointly by the British Crop Protection Council and CAB International and revised annually).
10. Relatively resistant trees and shrubs may be regarded as any of the commonly planted species other than those mentioned as notably susceptible in paragraph 7.
11. Where Lawson cypress has been killed it is probably safe to use in its place the similar-looking Leyland cypress provided that attention is paid to the precautions given in paragraph 9. Leyland cypress (*Cupressocyparis leylandii*) is not immune but even though it is such a common tree the disease has rarely been found on it. This is also often a suitable replacement for diseased yew hedges.

## Further Reading

Gibbs, J.N. (1994). *Phytophthora* root disease of common alder *Research and Information Note 258*. Forestry Commission, Farnham, Surrey.

Strouts, R.G. (1981). Phytophthora diseases of trees and shrubs. *Arboricultural Leaflet No 8*, HMSO.London

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