### Garden practice:

**Identifying fungal diseases**

#### Symptoms

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<th>Honey fungus</th>
<th>Phytophthora</th>
<th>Rust</th>
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<td><strong>Symptoms</strong></td>
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<td>Die-back and death of established plants, often spreading along hedge-lines and to nearby plants.</td>
<td>Yellowing, sparse foliage, die-back and death, often progressing from one side of the plant to the other.</td>
<td>Light-coloured leaf spots that develop into pustules (the spore-releasing stage of the disease).</td>
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#### Cause:
- Several species of Armillaria fungi kill the roots of a wide range of woody and herbaceous plants. With dry soil and drought or fungi on the extremities of the plant die-back. This can be quite dramatic with the onset of warmer weather, or can be progressive, over several seasons.

#### Solution:
- Prompt removal of infected subjects, and replacement with less-susceptible plants.

#### Controls:***
- No chemical controls are available for plants or soil. Immediate removal, including stamps and as many roots as possible, is the only control.

#### Author:
Guy Barter, RHS Chief Horticultural Advisor

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### More from the RHS

Search individual disease names at [www.rhs.org.uk](http://www.rhs.org.uk). 'Fungicides' for more on chemical controls, and 'Honey fungus' for a list of species less-susceptible to this pathogen.

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### Not every gardener

Not every gardener talks to their plants, but all plants can ‘speak’ to gardeners. However, plants have a limited vocabulary, so when they are sick it can be a challenge to deduce the cause. Leaves can go brown around their edges, or can develop spots, blotches or streaks within the leaf, or may yellow entirely. This limited repertoire of responses can have many causes, but fortunately a relatively limited range of fungal diseases cause a large proportion of plant problems encountered by most gardeners. Even a general level of knowledge of them can prove useful in day-to-day gardening.

#### Observe and diagnose

Accurate, rapid diagnosis is crucial: a plant suffering from weather damage or nutrient deficiency will not respond to fungicides, while plants with fungal diseases can infect other plants if incorrectly treated for nutrient problems. Many plant diseases affect stems and leaves and, in season, flowers and fruits. These are usually relatively easy to diagnose. If moulds or spots can be seen, they can often be differentiated into mildew or leaf-spot diseases. However, some diseases are not typical of this; rhododendron powdery mildew is common, but mould tissue is scanty and found on the underside of leaves – its main symptom is yellow blotches, not powder. If leaves are spotted or blistered, as a rule of thumb, a yellow margin around the spot indicates disease. Rusts usually have characteristic pustules but some, such as pear rust, cause distortions and galls on their two hosts (pear and juniper). Rust diseases are common, but tricky to diagnose. Roots provide a plant’s moisture supply, so if leaves turn brown and dry up on parts furthest from the roots, then root problems are likely. Excess water, drought, stress (associated with newly planted subjects), soil compaction, and even pot-bound root curling years after planting produce similar symptoms to root disease. Some simple sleuthing can disentangle the causes of fungal diseases, and so ensure appropriate treatment.

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**The number of diseases attacking woody ornamental plants seems ever-increasing, but it is not difficult to diagnose and treat the symptoms caused by many common pathogens.**

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### Phases of Growth

- **Light-coated leaf spots that develop into pustules** (the spore-releasing stage of the disease).

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Fungal diseases

Powdery mildew

Symptoms
White powdery mould – mainly on foliage and stems, but occasionally on flowers and fruits.

Cause: fungi spread by airborne, microscopic spores that contain water. Unlike most fungi, they are infectious in drier weather. They often attack plants stressed by dry soils in summer. Spores are relatively heavy so do not travel far, but easily infect nearby plants.

Powdery mildews cover plant surfaces, spoiling their appearance, and send feeding strands into plant tissue, weakening them. These fungi are usually host-specific, each infecting just a few related plants.

They persist over winter on living tissue and fallen foliage: careful pruning and removal of debris can reduce infection the following year.

Controls: grow plants suited to your soil’s conditions and keep them watered and mulched to reduce infection. Fungicides can offer good protection but may not cure infection. Vitax Organic 2 in 1 can be used against powdery mildews on all plants. On ornamentals, try products based on myclobutanil (Westland Rose Rescue and others) and triticonazole (Scotts Fungus Clear Ultra).

Solution Keep roots moist; use suitable fungicides as soon as disease appears.

Leaf spots

Symptoms
Dark spots on foliage, often with a yellow ‘halo’. Spots can expand and merge, leading to early leaf fall.

Cause: a wide range of fungi (and some bacteria) produce leaf spots. Fungi cause concentric rings of damage, often associated with tiny, barely visible dark dots – the fruiting bodies from which spores are released. Rose blackspot is one of the most common, like many other leaf spots, it favours wet conditions.

Leaf spots can be caused by other agents. Bacterial leaf spots are often water-soaked, have an obvious yellow halo, and, usually, angular edges. In some cases (for example, shothole disease and bacterial canker of Prunus) infected areas fall out, leaving a perforated leaf. Two common leaf spots, of Garrya and Photinia, are physiological responses to cold weather. They arise after winter and soon disappear under new growth.

Controls: few fungicides are specifically recommended. Products labelled for control of other diseases on ornamentals could be used (at owner’s risk) such as Westland Plant Rescue Fungus Control, Bayer Systhane Fungus Fighter and Bayer Multirose Concentrate.

Solution Keep plants growing strongly; remove any infected parts as soon as seen.

Research on honey fungus
Liz Beal, Plant Pathologist at RHS Garden Wisley

RHS members often ask what they can do once honey fungus (Armillaria) has been confirmed in their garden. The Society’s pathologists are working in several areas to learn more about the disease, how to control it and how to limit damage.

Two pilot studies, examining plants’ susceptibility to honey fungus, were recently completed. Species examined were Betula (birch), Prunus (cherry), Ligustrum (privet), Rosa (rose), Sorbus (rowan) and Fragaria (strawberry). These were chosen from the RHS list of susceptible plants, itself compiled from RHS member’s enquiries.

All plants were found to be susceptible to infection but strawberry, privet and rose had least resistance – in a laboratory environment over eight months, mortality rates were almost 90 percent in strawberry, and more than half the privet plants died. Infection and mortality are much slower outdoors.

Further study
Honey fungus grows slowly on agar, and it is difficult to artificially infect plants. To overcome this, Kathryn Ford (as part of her PhD at the University of Bristol) is trying to infect 16 non-woody plants within a glasshouse, including Lobelia cardinalis, Chrysanthemum maximum and Dianthus barbatus.

The aim of all these studies is to find a ‘model plant’ for honey fungus experiments. Kathryn also intends to develop an improved method of infection.

There will be a Science Update on Phytophthora diseases in a future issue of The Garden.