



## Plant Health – Diagnosis in Ornamental Plants An Overview

@ tyfucymru@lantra.co.uk

www.tyfucymru.co.uk

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# Plant Health – Diagnosis in Ornamental Plants An Overview

*Dr David Skydmore SPHP*



This webinar is one in a series of workshops and webinars comprising Tyfu Cymru's Plant Health Programme

Note:

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# Plant Health



To sell high quality plants you need to produce healthy plants. Plant pests and diseases (P&D) lead to production and sales losses.

It is important for the grower to be able to detect problems when they arise.

A knowledge of the symptoms caused by pests and diseases is important in recognising these problems and stopping them spreading

# Key topics we will cover



- Symptoms caused by
  - Pathogens
  - Pests
  - Physiological disorders
- Advanced diagnosis techniques

Tree health will be covered in more detail in a later webinar

# definitions



- **Pest** – an animal that causes damage to plants e.g. insect, rodent, nematode
- **Pathogen** – an organism that causes disease in plants e.g. fungi, water-mould, bacteria, viruses, mycoplasmas. Usually the Latin name is used.
- **Disease** – the collection of **symptoms** that are caused by a pathogen – given a common descriptive name
- **Disorder** – a plant problem caused by a physiological problem e.g. frost damage, nutrient deficiency, water stress

# Where do pests and diseases come from?



- Wind e.g. ash die-back
- Rain and splash dispersal e.g. potato blight
- Soil and irrigation water e.g. *Pythium* damping-off disease
- Infected stock
- Animal vectors e.g. aphid transmission of viruses
- Wounds, including during pruning and grafting
- International imports e.g. wooden pallets, fruit

# When did you first notice the problem



- Has it appeared suddenly?
- Is it on a lot of the plants?
- Is it on specific parts of the plant or does it affect the whole plant?

# Has it appeared suddenly?

If it is on only one plant check for mechanical damage

(wilt symptoms on tomato from damage to stem)



# Has it appeared suddenly?

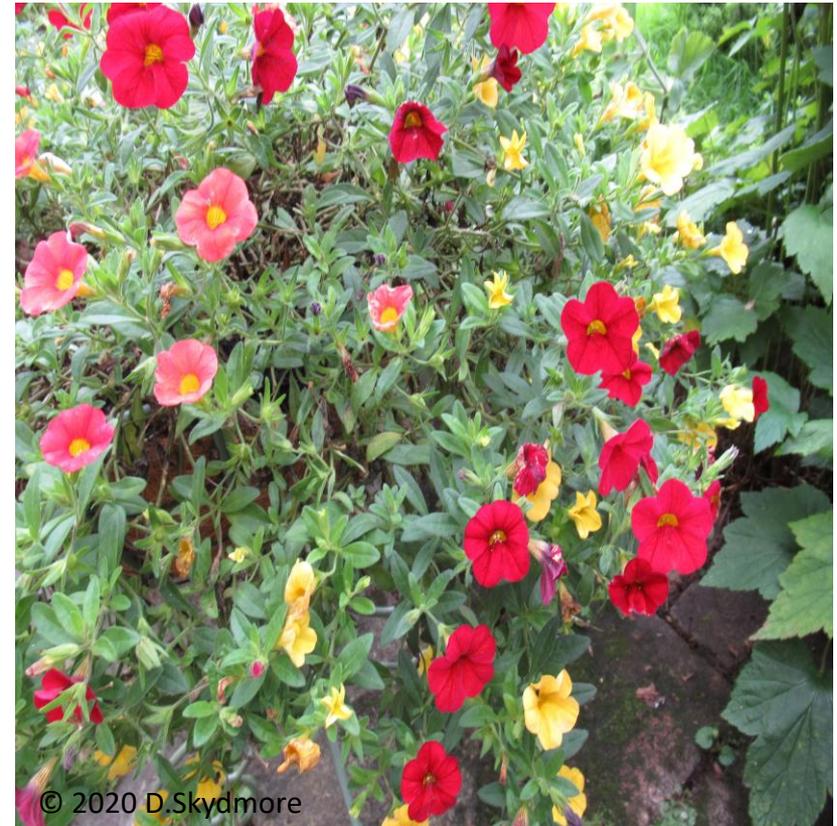


- If it is on several plants and has occurred quickly (e.g. overnight), check for chemical spray damage (often seen from the pattern of damage across the crop)
  - Also check the weather conditions e.g. frost, sea-spray salt, heat – giving scorch-like symptoms
- drought, waterlogging – giving wilt symptoms  
– also called stress

Leaf damage from  
frost on *Pelargonium*



If wilt symptoms first try watering  
(*Calibrachoa*)



# Is it on specific parts of the plant or does it affect the whole plant?



If the whole plant is affected, all at once, showing a wilt symptom or die-back, then there is likely to be:

- a root problem e.g. *Phytophthora* root rot
- a blockage of the vascular system e.g. *Verticillium* wilt of *Chrysanthemum*



Root disease in  
*Rhododendron*

# Is it on specific parts of the plant or does it affect the whole plant?



Pests, pathogens and disorders can affect different parts of the plant and this is used in their diagnosis:

Leaves

Stems

Flowers

Fruit – post-harvest diseases are also a problem here

Some apparent problems are natural parts of the plant's development – so learn to recognise how your plants develop



Leaf senescence as plant resources are diverted to new growth – maybe reduced by feeding





# Nutrient deficiencies are most obvious on leaves –corrected by soil test and feed

For example, characteristic leaf symptoms may be:

**Nitrogen** – pale upper leaves, lower leaves yellow

**Potassium** – yellowing at the tips and edges

**Phosphorus** – darker than usual

**Iron** – yellow with greener veins

Viruses may also cause similar symptoms

Yellowing of leaves is called **chlorosis**



Fungal and some bacterial diseases cause leaf spots or tip necrosis

# *Phytophthora ramorum* on Rhododendron



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# Anthracnose of oak

anthracnose is symptom of necrotic lesions caused by one of several, usually fungal, pathogens



# *Diplocarpon rosae* Rose Black spot disease



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# *Phytophthora infestans* late blight of tomato



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Other pathogens may be characteristic because you can see the organism

e.g.

Powdery mildew – white on the upper leaf surface

Downy mildew – white on the underside

Rust – yellow/orange/white pustules

# *Erysiphe aguilgiae*



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# *Melampsora* sp. rust on *Populus nigra*





# Insects can cause characteristic damage to leaves

*Phytomyza ilicis* - Holly Leaf Miner fly  
larva -symptom  
(causes only cosmetic impact)



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# *Pieris brassicae* (Large White Butterfly) caterpillar on cabbage - symptom



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# Skeletonised alder leaf by *Agelastica alni* (alder leaf beetle)



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# *Otiorhynchus sulcatus* (vine weevil) on *Rhododendron* - symptom



Some organisms disrupt the hormones in the plant producing distinctive symptoms



Symptom of currant blister aphid

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So, when there are characteristic symptoms, the pest or pathogen may be sufficiently easy to identify to a level e.g. rust, vine weevil for an effective control to be decided upon.

With insect pests, search for the insect infestation – the insects are usually large enough for you to be able to identify them using **an identification key.**

However, sometimes the symptoms are less specific e.g. root decay and die back. Here, there may even be a number of pathogens. It may then be necessary to use more advanced diagnostic techniques to identify the pathogen species exactly. It is most usual to contract a consultant to carry this out.

# Advanced detection of disease



- Image spectroscopy to detect type of stress
- Electronic nose and volatile compound analysis to detect type of stress (new versions can be attached to a Smart Phone)

# Advanced identification of pathogen



- Traditional microscope identification from spores (often from cultures)
- Serology and immunoassays
- Molecular analysis and “fingerprinting”



# Complete diagnosis



Conventionally, to prove that a pathogen is the cause of the disease, methods using Koch's Postulates are used.

In this, the organism is isolated, a plant is inoculated to see if the same symptoms are shown, and then the pathogen is re-isolated.

# Sources of information on P&D (examples)



## Websites

Make sure you are looking at UK advice. Different countries have different diseases and different host ranges, and different permitted treatments

## Ornamentals

<https://www.rhs.org.uk/advice/plant-problems/diseases-disorders>

# Sources of information on P&D (examples)



Subscriptions:

AHDB

HTA

Horticulture Week (fact sheets and disease alerts)

# Sources of information on P&D (examples)



Books (using identification keys)

**RHS Pests and Diseases**, Pippa Greenwood and Andrew Halstead

**Collins Pests, diseases and disorders of garden plants** 4<sup>th</sup> edition Stefan Buczacki and Keith Harris

Advanced articles

**Plant Pathologist's Pocketbook** 3rd Edition

J.M.Waller, Jillian M. Lenné, S.J.Waller

# Sources of information on P&D (example)

Consultancy services



e.g. FERA Plant Clinic

A number of consultancy businesses offer identification services.

Ask the consultants how they want material to be packaged before it is sent to them. Sometimes plastic packaging can encourage the growth of organisms and hide the actual pathogen.



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