

Inspecting a Plant for Problems: What to Look For

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When one is presented with a problem during plant propagation or cultivation, the cause(s) may be known and the problem rectified. Under other circumstances, for example, through lack of knowledge of the environment in which you're working or the plant which you are producing, a remedy may not be as straightforward.

Early diagnosis and the adoption of a holistic attitude to the growing of any crop or line are paramount. Over time, if records are maintained one may learn to predict outbreaks of disease, pests, or other problems, and take precautions against recurrences.

DIAGNOSIS

Obvious Diagnosis. Frequently, the cause of a problem is known—or at least anticipated or prevented (e.g., *Hebe* is susceptible to scale, *Jacaranda* spp. are frost tender when juvenile).

Not-So-Obvious Diagnosis. Pride and professional arrogance are the downfall of many workplaces. It's better to acknowledge that there is a problem and go from there, than to think, "maybe it'll go away", or, "it's my fault so I have to deal with it...even if I don't know what it is." It's better to mention it to someone than pour through libraries of books trying to find an answer.

Within any business there is usually someone who has already done that, or merely has a heightened awareness of the plant or environment and its history.

Haven't Got a Clue. Sometimes the answers are not readily available. Sometimes the perceived or recommended solution isn't successful. This is when a methodical approach is required.

Inspecting a Plant for Problems. Regular inspection of plants and propagules is a must. Accept that any individual may not be superhuman. We can all miss the obvious. Encourage a team approach in the workplace. If someone notices a problem they should mention it. It's far better that the person ultimately responsible is told about something ad nauseam than that a plague infests the entire site. Complacency will only heighten a problem.

Assuming that there are obvious symptoms, grab a pest and disease book; look at the pictures, read what the author has to say. Often a \$5.00 magazine or your old edition of Yates Garden Guide will supply the answers. If they're of no use, and you have ready access to texts published specifically for commercial growers, have a quick browse.

The following table may be of assistance with diagnosis. Remember that time is of the essence. If you spend a week trying to discover a remedy, it may be too late.

Table 1. Diagnosis of plant disorders.

Symptom	Possible causes	Treatment
Spindly growth	Low light (i.e., shade), excess water, high temperatures, plants too close together	Improve light, cut watering, reduce night temperature in greenhouse by cooling or ventilation, reduce feeding, increase spacing between plants
Growth reduced	Insufficient nutrients, and/or water	Feed more often, water more often
Old or lower leaves yellowing	Nitrogen deficiency	Increase proportion of nitrogen in your solution; change the form of nitrogen being used to a form which is easier to be taken in by the plant; check solubility of nitrogen in your formula; check pH (this can affect nutrient availability); and adjust if needed
Young leaves yellowing between veins	Iron deficiency	Spray or drench with iron
Purple leaves	Phosphorus deficiency	Apply superphosphate; increase concentration of phosphorus in fertilizer
Root tips burnt or discoloured	Excess fertilizer or salts, toxic chemicals in medium (sometimes occurs when medium is fresh)	Leach thoroughly to wash away excess nutrient or toxin; check levels with an EC meter
Woody growth	Plants overhardened (i.e., exposed to tough conditions), or slow growing	Increase feeding, if problem is excessive, also prune
Stems very wet and decaying at base of the plant	Damping off disease caused by dirty conditions, high humidity and/or overcrowding	Thin out plants, apply fungicide
Algae, moss, or liverwort on surface of the medium	Excess moisture and nutrient on surface; doesn't harm plant initially but can impair flow of nutrient solution in the long term	Reduce watering, increase ventilation, use better draining medium; some chemicals (such as ferrous sulphate) can be used to kill algae and moss
Poor root growth	Excess nitrogen, poor aeration or drainage in medium, low temperature in medium, toxic chemicals	Determine which of these is the problem and act accordingly

The above disorders will often weaken a plant and increase its susceptibility to a range of more serious disorders. More often than not, more than one factor is involved in a plant's ultimate lack of vigour. Beginning at a base level, potential problems can be systematically considered and a solution will be forthcoming.

The following procedure, as published by The Australian Horticultural Correspondence School is a straightforward checklist for diagnosis.

FIRST

Systematically examine the plant and take note of any abnormalities.

1) Look at the leaves.

- Are there abnormal markings, swellings, distorted shapes, etc.
- Is there any discolouration
- Are there dead patches or holes

2) Look at the fruit and flowers.

- Are the flowers and fruit developing well
- Is there any fruit drop
- Is fruit undersized (this indicates weakness)

3) Look at the stems/branches.

- Are the growth tips lush and growing fast (a healthy plant will have lush, growing tips. If other parts are damaged but the tips are lush, this can indicate that the plant is recovering from a previous problem)
- Are there any abnormalities on the stems

4) Look at the roots.

- Are the root tips lush and healthy or black and rotting
- Are the roots strong or is the plant loose in the ground
- Are roots coming out of the surface of the ground (this may indicate soil is frequently infertile or dry deep down—roots are coming up for water and nutrients; or soil has been eroded away)

5) What parts of the plant are most damaged—the parts which are most exposed to the problem will be most affected.

- Frost damage occurs more on parts most exposed to frost
- Sunburn occurs more on parts exposed more to the sun
- Fruit rots may occur on branches close to the ground where disease spores can splash up from the soil
- Small animals tend to eat lush growth in preference to older tough foliage, while grazing animals will eat lower growth on shrubs and trees that is within their reach

SECOND

Examine the surroundings and note anything which relates to abnormalities noticed when you examined the plant.

1) Soil.

- Is it wet or dry
- Is it well drained

2) Surrounding plants.

- Are they healthy or not
- Do they have similar symptoms

3) Environment.

- Consider exposure to wind, frost, sun, etc.
- Has anything been changed since the problem arose (e.g., a building or large tree which provided protection may have been removed)
- Is the plant at the bottom of a hill or slope? Could something have washed down from further up the hill (e.g., herbicide, disease from another plant, etc.)

THIRD

- Decide which group the main problem comes from—pest, disease, nutrition, environment, or weed; decide whether it is likely that there is more than one major problem
- Decide which of the five main groups the problem is most likely to come from
- Eliminate the groups you can
- Identify the groups you consider possible, and those you are sure of

FOURTH

Consult a text, or contact an entomologist, nematologist, field extension officer, or colleague with your deductions/eliminations in mind. Alternatively, cross-reference the genus, species, or cultivar of plant, using a reliable reference with the most likely disorder.

If you are still unsure of an accurate diagnosis, make an educated guess and devise a treatment which could be used. Apply the treatment and monitor the results according to whether or not the plant responds.

Remember that lack of vigour, chlorosis, or necrosis can be the result of more than just 'pests' or 'diseases'. Problems that can be encountered can include:

- 1) PESTS—ranging from the microscopic to dogs or rabbits
- 2) DISEASES—commonly fungi, viruses, or bacteria
- 3) ENVIRONMENTAL DISORDERS—including pollutants, soils, and climatic considerations
- 4) NUTRITIONAL EXTREMES—in relation to the plant's needs
- 5) WEEDS: which often harbour pests and diseases and will compete with the desirable plant for its requirements
- 6) INSECTS—frequently the most common pests experienced. If you conclude that an insect is the causative agent consider the following list, which includes the most common insect pests.
 - INSECTS (and other pests) WHICH CHEW ABOVE GROUND: ants, armyworm, bugs, beetles, caterpillars, crickets, cutworm, earwig, flea beetle, grasshopper, leafminer, leafroller, leaf skeletonizer, sawfly, slug, snail, springtail, and weevil.

- INSECTS (and other pests) WHICH SUCK PLANT PARTS ABOVEGROUND: aphid, harlequin bug, lace bug, leafhopper, mealy bug, mite, psyllid, scale, squash bug, thrip, tree hopper, and whitefly.
- INSECTS (and other pests) WHICH FEED BELOW GROUND: root aphid, root nematodes, root borer, rootworm, root weevil, woolly aphid, wireworm, and beetle larvae.
- BORERS (including into fruit): codling moth, bark beetle, corn earworm, white pine weevil, melon worm, longicon beetle, European apple sawfly, etc.

Given that we are all concerned with our health, and that of our staff and families, and money-cum-financial constraints, the remedy you decide to adopt should bear at least these factors in mind. Opt for the least dangerous treatment; it will frequently be the most successful and cheapest!

Research the life cycle of a disease or pest and consider the implementation of biocontrols or integrated pest management techniques. Dare to consult organic or biodynamic growers. It may be that something can be effectively lured from your growing area, and subsequently prevented or at least reduced in its impact.

Consider the overall environment in which your production occurs, and the conditions under which your plants are growing. How closely do they emulate the indigenous environment of the species?

Remember that prevention IS better than cure.