

Do You REALLY Know What the Problem Is?

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*If you **don't** know,
there is no way to treat a
problem or to prevent it...*

Before taking action, ensure correct identification

Once you know for sure, you can find out about:

- Biology, life cycle, behaviour
- Prevention & control methods

For colour photos of pests & diseases:

www.lindagilkeson.ca



Most of the insects in your garden are **not** pests



Distortions have many causes

Cold injury, mites, thrips, aphids, virus diseases.....



Pea enation
mosaic virus



Thrips injury

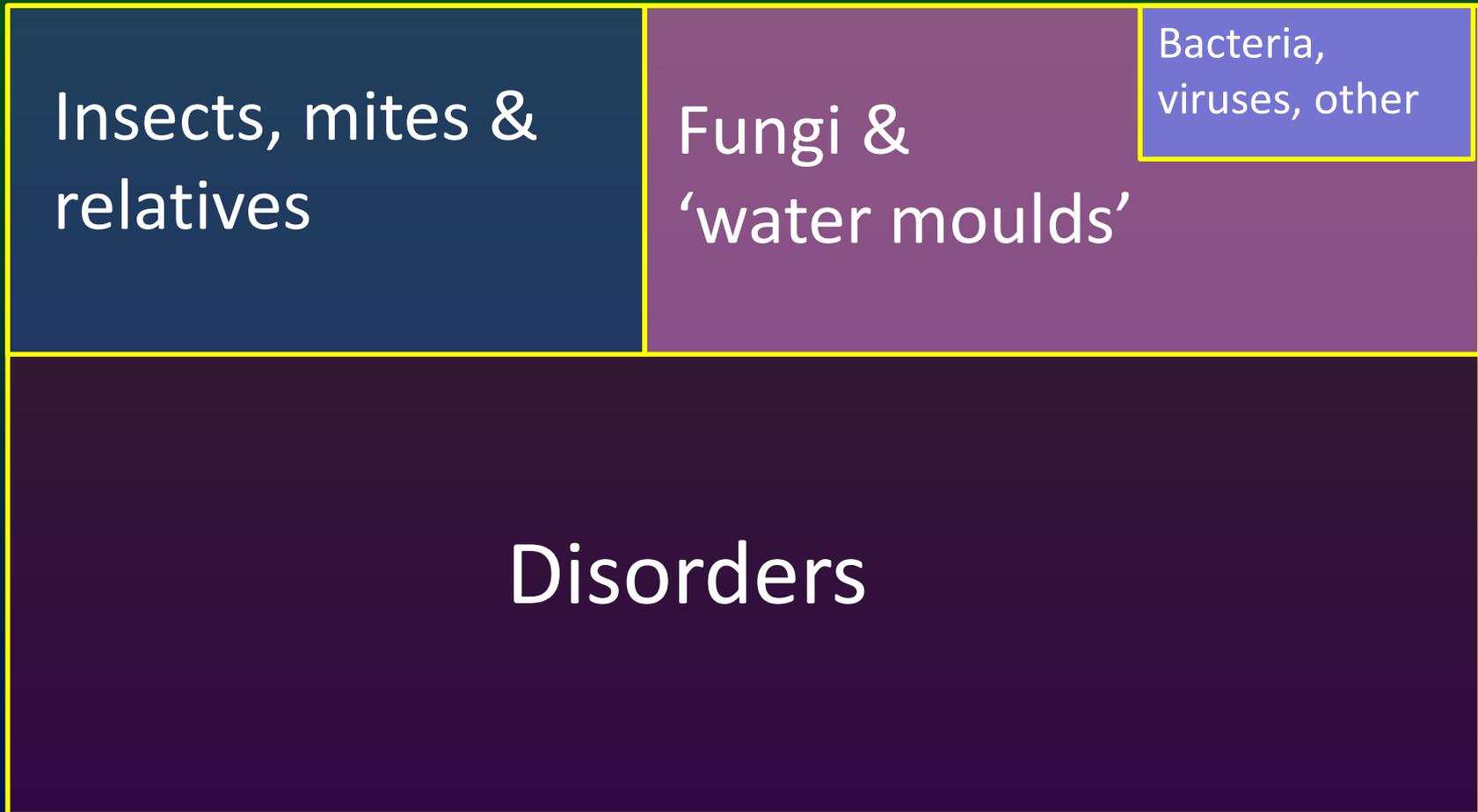


Distorted flowers due to
cold injury during bud
development



Distorted flowers due
to aphid attack

*Causes of Plant Damage**



* Excluding deer, rabbits, birds, racoons, rats, squirrels.....sigh!

Most plant problems are 'disorders'

- 50-75% of samples sent to diagnostic labs turn out not be pest or disease problems
- Nutrient deficiencies, physical injury, irregular watering, temperature extremes, chemical damage...



Chemical damage?

- Leaf burn from dormant or summer oil spray drift
- Repeated use of insecticidal soap or sulphur sprays
- Homemade 'pesticides' (soaps, detergent, alcohol, etc.)
- Salt runoff from sidewalks, roads



Sometimes gardeners do more harm than pests...

- Indoor plant, sprayed repeatedly with insecticidal soap for mealybugs



Temperature extremes cause a lot of damage

Our climate continues to change:

- Higher average temperatures = greater extremes of heat
 - *Hottest 16 years on record have occurred in the last 17 years*
- More winter precipitation = flooding, waterlogging
- Less rain in the summer = longer dry period
- Increasing storm intensity = wind damage
- Slowing jet stream = extended periods of extreme weather
 - *Number of cold & heat waves/year has risen 70% since 2000*

The 2015 heat & drought was a preview of a predicted 'average' summer mid-century.

Heat + Drought=Devastation

Closed stomata:

- No cooling from evaporation → leaf temperatures rise >5-10°F → leaf cells killed by extreme heat
- No photosynthesis can occur → plant can't make food
- No movement of water from roots → no nutrients from soil

Plants can adapt to moderate heat stress OR drought stress, but not when they occur together.



*We have seen a lot of heat injury
in recent summers*



Is it sunscald?

- Worst on plant parts facing the sun & leaf margin and tips farthest from leaf veins



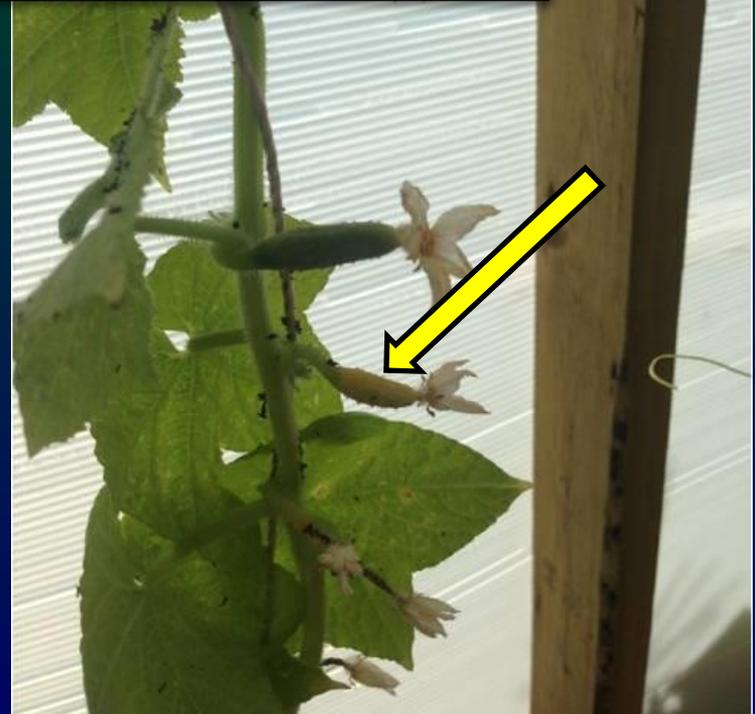
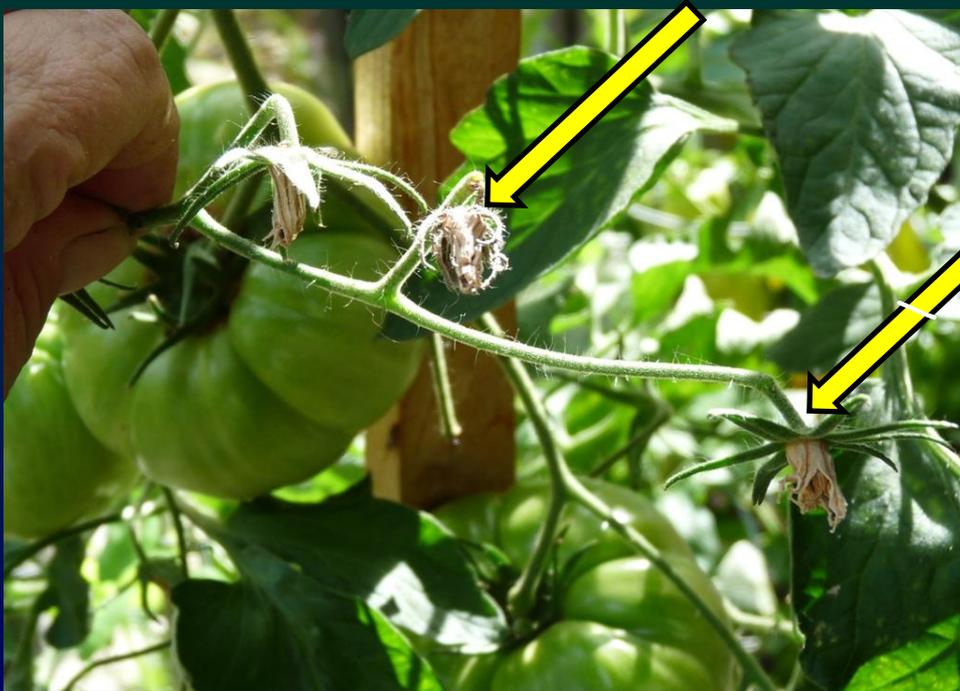
Leaf scorch on dogwood

- Shade adapted, understory plant is seriously stressed in full sun, especially without sufficient water



High temperatures kill pollen

- Tomato pollen is sterilized above 85-90°F → flowers drop
- Greenhouses can also get too hot for cucumber & pepper flowers



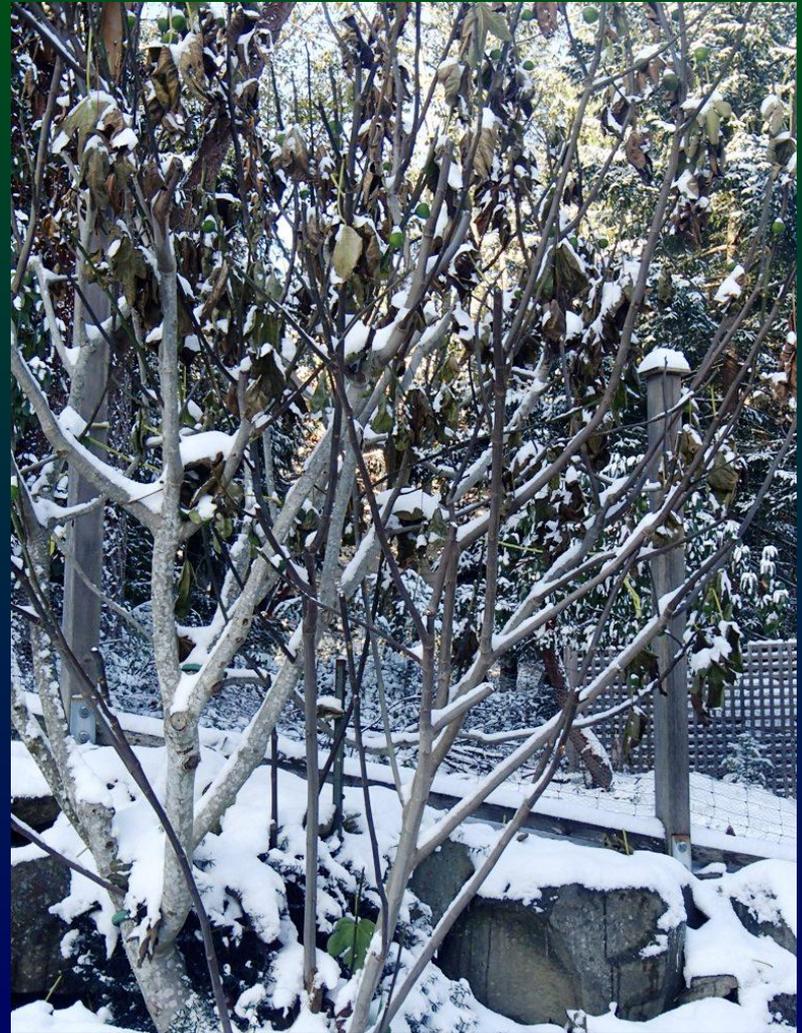
Cold injury

Worst when cold occurs unusually early (October, November) or late (March, April):

- Early cold damages plants that are not hardened off
- Spring frosts kill fruit tree blossoms, injures growing points



'Blind' cabbage from frost injury



Cold injury

- May not show until late spring (later if roots were injured): shoots die back, flower buds don't open;

Diagnosing:

- Keep temperature records
- Injury on all ages of leaves;
- Often worst on low branches & plants in “frost pockets”



February cold injury to Arbutus/Madrone

Late spring cold: Bolting biennials

- Biennials respond to cool temperatures by flowering prematurely (**vernalization**)
- 2-3 weeks exposure to 40-50° F can vernalize leeks, onions, beets, Swiss chard, cabbage family, celery, celeriac
- Only happens if plant is large enough to sustain flowers—
but that's not very big!



Water Stress

Waterlogged soil and drought both kill roots & root hairs

With injured and fewer roots, plants:

- Are less able to take up nutrients and water
- Become even more vulnerable to drought
- Are susceptible to root diseases (e.g., *Phytophthora*)
- Are more likely to blow down (trees)

This plays a key role in nutrient deficiencies, poor growth rates, susceptibility to diseases & pests

Drought stressed conifers

- Stress cones formed in spring of 2016 after the long dry summer of 2015
- Trees along the coast had so many cones they appeared brown (and what a year it was for pollen!)



Climate change vs. Cedars

Western Redcedar:

- Flagging is normal in the fall, but cedars are dying from drought stress throughout the region
- Cedar is expected to die out on coastal zones as climate changes



Common vegetable disorders

- Hollow heart on potato (drought, irregular irrigation)
- Tipburn on lettuce (calcium deficiency in soil)
- Ricy head on cauliflower (high temperatures)



Complex metabolic disorders

- Interaction of growth, weather, irrigation, nutrients & cultural methods, which influence nutrients in leaf, flower or fruit tissue
- Most made worse by heat and/or drought stress
- Plant tissues are often deficient in **calcium**, usually due to interrupted calcium transport within plant, not lack of calcium in soil
- Symptoms disappear in new tissues formed after growing conditions improve

These are frequently mistaken for diseases

Blossom end rot

Calcium deficiency in tissues:

- Usually due to irregular irrigation (too dry, then too wet)
- Sometimes caused by deficiency of **available** calcium in soil



Greenback/Green Shoulders

- Bright sun & intense heat stops ripening process in affected cells
- May also be related to potassium deficiency
- Prevention: Cool greenhouses; leave more foliage on plants to shade fruit; ensure enough soil potassium
- Large fruited & paste tomatoes are most susceptible



Common apple disorders

- Watercore: High temperature, low calcium, high nitrogen, excessive fruit thinning



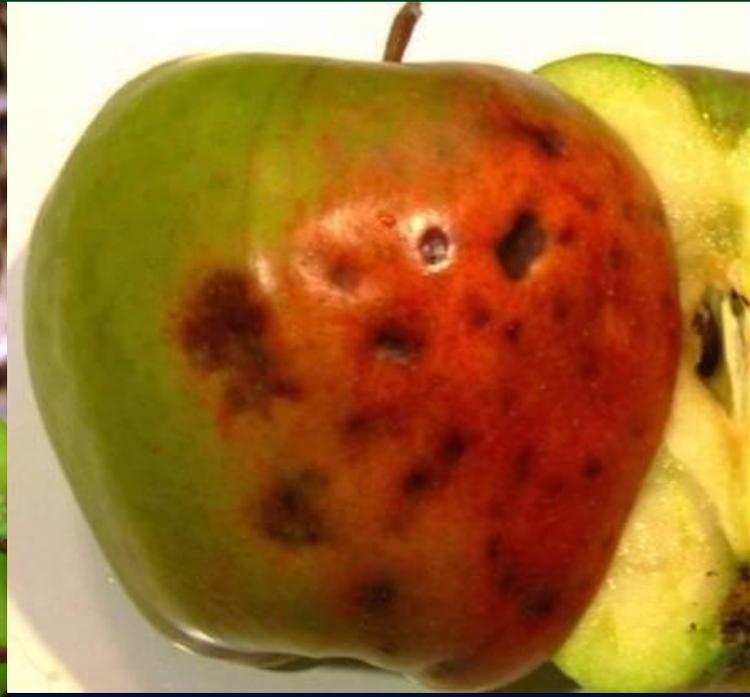
- Bitter Pit: Calcium deficiency in fruit tissue; drought, excessive fertilization



Easily mistaken for disease



Apple scab



Bitter pit

Disease or Disorder ?

- Limited to one cultivar, genus or plant family
- Spores may be present
- Damage & symptoms often starts on oldest leaves first
- Damage progresses as plants age

- Shows on unrelated species growing in same conditions
- Spores not present
- Damage occurs suddenly, on all ages of leaves, often on one side of plant
- New growth is not affected if conditions improve

Recent weather is an important clue for both

Diagnosing injury

Wind borne salt: Exposed leaves
most affected



Cold injury: Lowest leaves most
affected

Diagnosing fungus disease

Fungal spores & growth pattern

- Spores look like dust; colour helps in diagnosis
- Concentric ring pattern

Sporulation zone



Diagnosing fungus diseases

Oldest leaves often infected first: Where plants have the least defensive chemicals in leaves



Presence of disease doesn't mean you must take action

- Tar spot on maple does no damage, shows up as leaves are starting to drop



There may be more than one cause

Injured tissue is a common entry point for secondary infections, especially *Botrytis* (Grey mould):

- Tip burn in lettuce from calcium deficiency
- Tissue damaged by freezing or sunscald



Injury opens way for disease

- European canker infects apple branch where bark was damaged by rubbing against a post



...Which is why I don't like espaliered apples and pears in this climate!

*Disorders may also be mistaken for
insect attack*



Apple maggot



Bitter pit

Insects or Disorder ?

- | | |
|--|---|
| <ul style="list-style-type: none">• Usually limited to one genus or plant family• Organisms or frass* visible under magnification• Damage expands over time as population grows• Beneficial insects usually appear• Time of year more important clue than recent weather | <ul style="list-style-type: none">• Shows on unrelated species growing in same conditions• No sign of frass* or critters• Damage occurs suddenly on all ages of leaves, often on one side of plant• New growth is fine if conditions improve• Recent weather is an important clue |
|--|---|

* Specks of bug poop

Some are **VERY** hard to diagnose

Edema disorder



Leaf cells rupture, causing warty blisters due to sudden drop in temperatures, wet soil, high relative humidity

Thrips damage



Plant to attract natural enemies, ensure crops are well watered

Insect attack may also be mistaken for disease

Thrips injury



Powdery mildew



American hybrids are not susceptible

Plant response to insect saliva (toxemia) looks like disease

- Feeding by just 1 or 2 aphids can stimulate this response

Currant aphids



Cabbage aphids

Tiny mites are often mistaken for disease

Pear leaf blister mite



Pear scab (fungus disease)



Native predator mites, lime sulphur sprays at leaf drop & bud break

Destroy dropped leaves; spray dormant lime sulphur

Plant stress opens way for insect attack

- Borers attack trees weakened by poor growing conditions
- Aphids thrive on drought-stressed plants



Aphid honeydew on street maples

It can be hard to distinguish between disorders, disease & pest damage

- Learn common problems for different plants in this region
- Be alert to recent weather, also last winter's conditions
- Know that not everything has an explanation...and some pretty weird things are normal!

Jostaberry leaf netting



One variety of Serrano pepper



Diagnosing Steps

- **Look closely for signs:** Spores or fungal growth? Tiny insects, mites, frass?
- **Check pattern of damage:** Is it random? uniform? affecting one part of plant? Affecting the same age of leaf or all ages of leaves? How does the new growth look?
- **Note timing of damage:** Did it appear suddenly? Gradually? In relation to wet weather or unusually high or low temperatures? Is it continuing to expand or spread?

The cause of some damage may remain forever a mystery—

In that case, what is the best thing you can do for a troubled plant?

[Hint: Never spray 'just in case'.....]

Improve Plant Health

- Choose plants best adapted to local climate
- Improve growing conditions: Check sun exposure, soil drainage, soil pH, nutrients
- Improve management: Review pruning, irrigation, mulching
- Prevent injury: Rubbing on tree bark, 'weed-eater' injury
- Be alert to weather forecasts: Take prompt action to shade plants in heat waves or protect in extreme cold spells

Now, don't panic!

*Just make sure you know what the
problem is before taking action*

My web site has over 275 photos to help
you diagnose problems

www.lindagilkeson.ca

