

# Tree Health, Hazards, and Current Diseases

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# Health vs. Structure

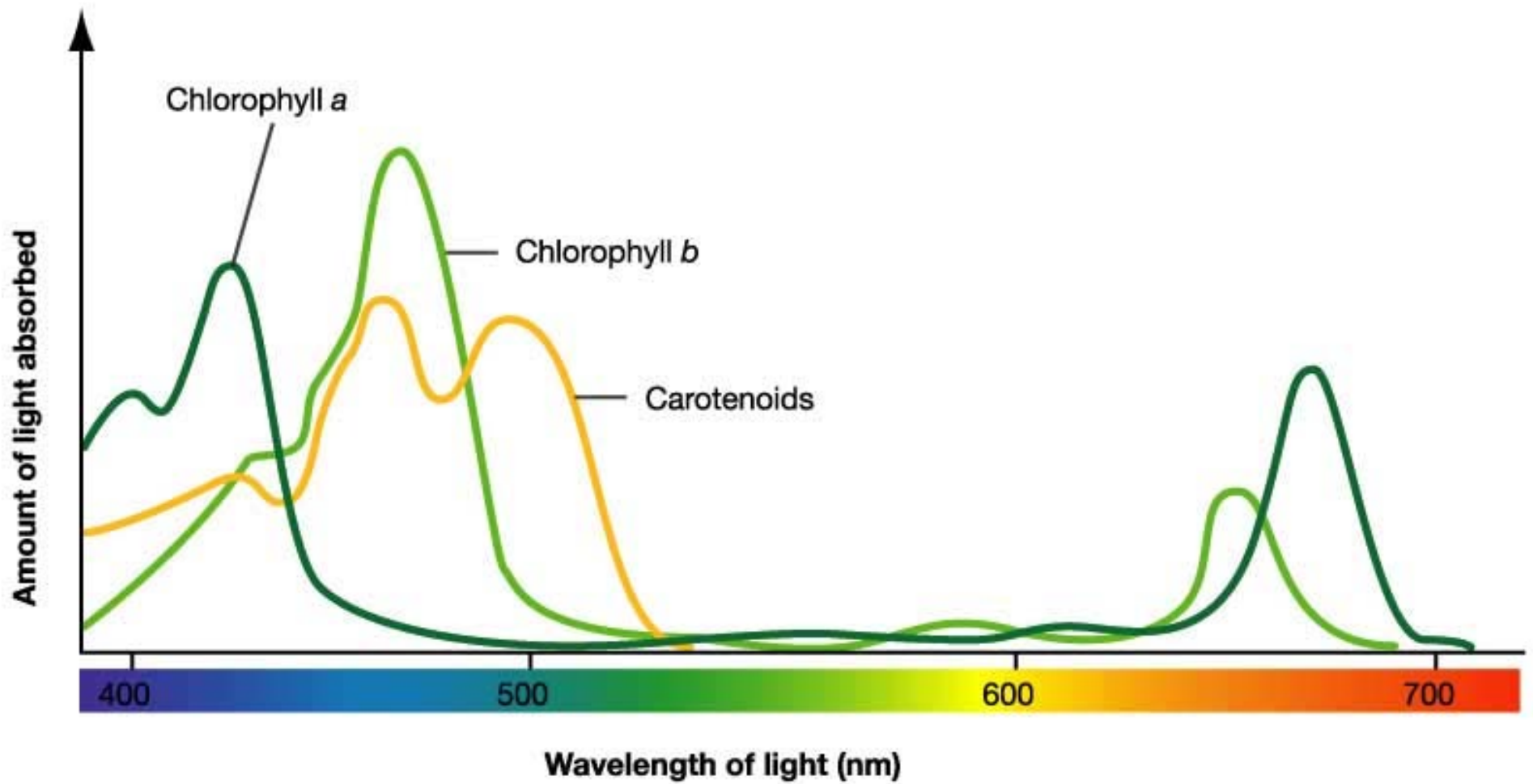
- Healthy:  
Physiological  
term
  - What most folks  
say they want
- Structure:  
Anatomical term
  - What many folks  
really want
- They are related



Photo: freeimageslive.com

# Health, Physiology, and Photosynthesis

- Trees make their food from sunlight
  - Red and blue light drive two different photosystems
    - Each photosystem makes a 3 (or 4) carbon sugar
    - Lots of different chlorophylls
    - Lots of accessory pigments
      - Carotenoids
      - Anthocyanins
  - Green light reflected
- Trees metabolize these same sugars to live, grow, and reproduce
  - Energy budget



[http://www.bio.miami.edu/dana/pix/chlorophyll\\_spectrum.jpg](http://www.bio.miami.edu/dana/pix/chlorophyll_spectrum.jpg)

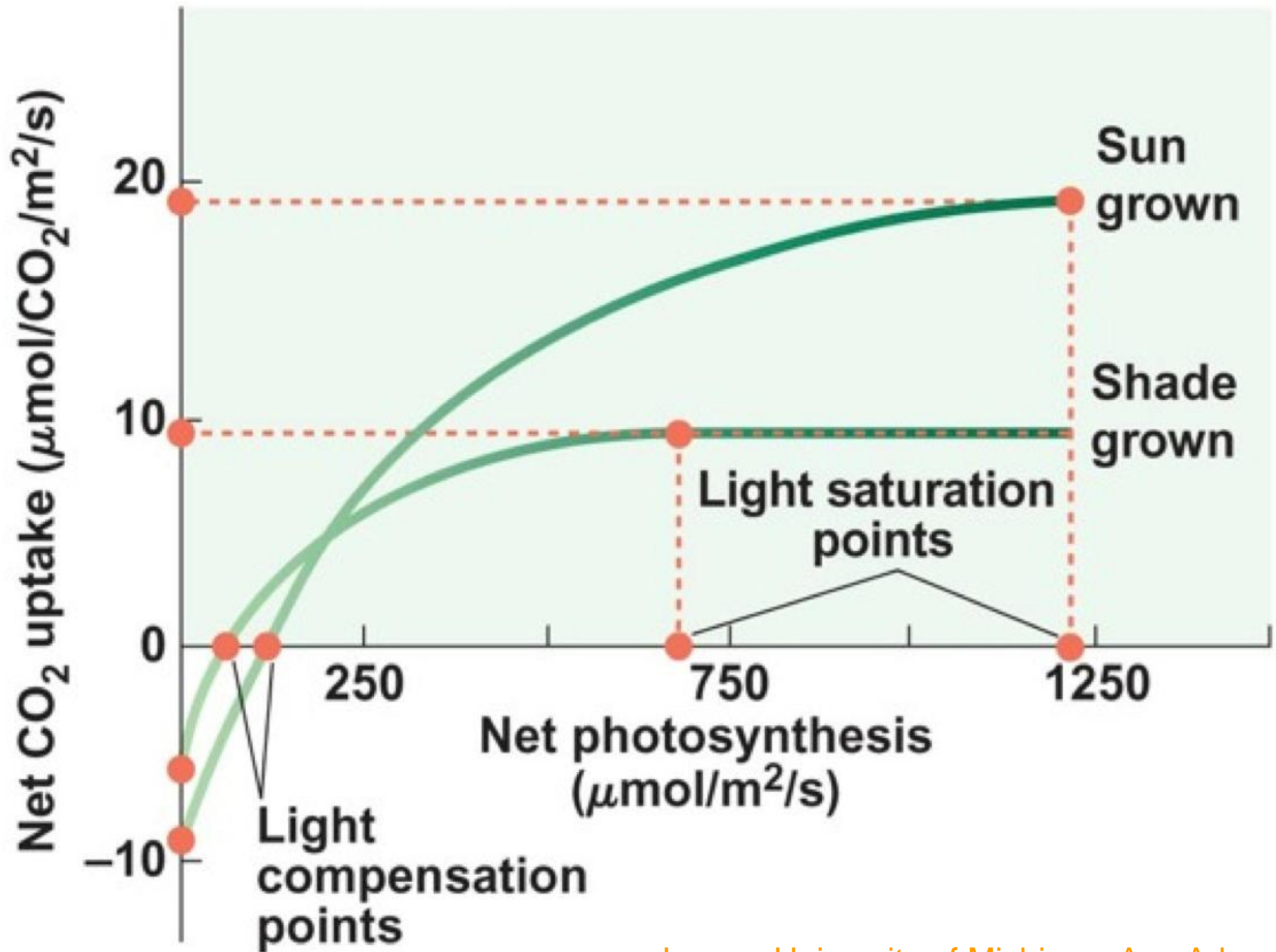


Image: University of Michigan, Ann Arbor

# Hazard Assessment 101

- There has to be a target
  - Are you assessing for worker safety, or for homeowner safety?



Image: Tree Associates, Davis, CA

# Hazard Assessment 101

- There has to be a target
- Stand back and look at canopy
  1. Overall canopy:
    1. Widowmakers: dead / hanging branches >2" dia
    2. Dead patches in canopy: dead / decayed branches







Image: [nooksand.wordpress.com](http://nooksand.wordpress.com)

# Hazard Assessment

- How stable is that branch?



# Hazard Assessment 101

- There has to be a target
- Stand back and look at canopy
  1. Overall canopy:
    1. Widowmakers: dead / hanging branches >2" dia
    2. Dead patches in canopy: dead / decayed branches
  2. Co-dominant stems, weak branch unions

# Weak branch unions

- Common on co-dominant stems
- Usually their own weight pulls them apart



# Hazard Assessment 101

- There has to be a target
- Stand back and look at canopy
  1. Overall canopy:
    1. Widowmakers: dead / hanging branches >2" dia
    2. Dead patches in canopy: dead / decayed branches
  2. Co-dominant stems, weak branch unions
  3. Cracks and/or decayed trunk wood









# Cracks / Decay

- Deep fissures in bark going to wood
- Longitudinal splits
- Foreign objects / past damage
- Fungal growth

# Hazard Assessment 101

- There has to be a target
- Stand back and look at canopy
  1. Overall canopy:
    1. Widowmakers: dead / hanging branches >2" dia
    2. Dead patches in canopy: dead / decayed branches
  2. Co-dominant stems, weak branch unions
  3. Cracks and/or decayed trunk wood
  4. Root problems



Image: Bob Polomski, Clemson U.

# Root Problems

- These can be the hardest to find
- Take the time to do a root collar inspection



# Root collar

- This is where lots of serious problems hide
  - Girdling roots
  - Soil lifting or fracturing
  - Decay fungi





# Drought

- Populations in 1950's were:
  - People: half of what it is now (US Census)
  - Mulberries in Terra Linda: almost double what it is now (according to long-time locals)
- Lawns and fruitless mulberries planted in tract homes
- Homes still there, some mulberries still there, but the landscape has changed





# Symptoms

- Upper canopy:
  - Leaves small and yellow
  - Branch dieback
- Lower canopy
  - Leaves full and green
  - Some sprouting





# One lawn left

- Gophers active in this lawn
  - Limited yellowing and branch dieback











# Changing times

- Changing canopies
  - Lack of resources
- Cultural shifts
  - Economic
  - Environmental
    - Cheaper water in 1950's?
- Environment never static
  - Species adapt or die out
  - Survivors not the toughest, but the most adaptable







*Solve your pest problems with UC's best science*

### Announcements

- o [UC IPM Web site begins makeover](#)
- o [New! Vineyard Pest Identification and Monitoring Cards](#)

### What's New

- o [Green Bulletin November 2011 issue](#)
- o [New Year-Round IPM Programs: Asparagus, Corn, Cucurbits, Peppers](#)
- o [Revised Pest Notes: House Mouse, Rats, Lawn Diseases, Bee and Wasp Stings](#)
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## Home, garden, turf, & landscape pests

University of California's official guidelines for managing pests with environmentally sound methods. ([More...](#))

Search home & landscape:

### Pests of homes and structures

- [Household](#): pests of homes, structures, people and pets
  - Pests that sting, bite, or injure
  - Wood-destroying, food, fabric, and nuisance pests
  - Vertebrate pests birds, mammals, and reptiles

### Pests in gardens and landscapes

*Choose a plant to find the most likely source of your pest problem*

- [Flowers](#)
- [Fruit trees, nuts, berries, and grapevines](#)
- [Lawns and turf](#), including comprehensive lawn guide
- [Trees and shrubs](#), including roses and other ornamentals
- [Vegetables and melons](#)

### *Some common pests and methods*

- [Birds, mammals, and reptiles](#): vertebrate pests



<a href="#">Metrosideros</a>	<i>Metrosideros</i> spp.	Myrtaceae (Myrtle family)
<a href="#">Mexican blue palm</a>	<i>Brahea armata</i>	Arecaceae (Palm family)
<a href="#">Mexican fan palm</a>	<i>Washingtonia robusta</i>	Arecaceae (Palm family)
<a href="#">Mexican orange</a>	<i>Choisya ternata</i>	Rutaceae (Rue family)
<a href="#">Mimosa</a>	<i>Albizia</i> spp.	Fabaceae (Pea family)
<a href="#">Mock orange</a>	<i>Choisya ternata</i>	Rutaceae (Rue family)
<a href="#">Monkey flower</a>	<i>Diplacus</i> spp.	Scrophulariaceae (Figwort family)
<a href="#">Monkey flower</a>	<i>Mimulus</i> spp.	Scrophulariaceae (Figwort family)
<a href="#">Monkey puzzle tree</a>	<i>Araucaria</i> spp.	Araucariaceae (Araucaria family)
<a href="#">Mountain ash</a>	<i>Sorbus</i> spp.	Rosaceae (Rose family)
<a href="#">Mountain mahogany</a>	<i>Cercocarpus</i> spp.	Rosaceae (Rose family)
<a href="#">Mugwort</a>	<i>Artemisia</i> spp.	Asteraceae (Sunflower family)
<a href="#">Mulberry</a>	<i>Morus</i> spp.	Moraceae (Mulberry family)
<a href="#">Myoporum</a>	<i>Myoporum</i> spp.	Myoporaceae (Myoporum family)
<a href="#">Myrtle</a>	<i>Melaleuca</i> spp.	Myrtaceae (Myrtle family)
<a href="#">Nandina</a>	<i>Nandina domestica</i>	Berberidaceae (Barberry family)
<a href="#">Natal plum</a>	<i>Carissa grandiflora</i>	Apocynaceae (Dogbane family)
<a href="#">Natal plum</a>	<i>Carissa macrocarpa</i>	Apocynaceae (Dogbane family)
<a href="#">New Zealand Christmas tree</a>	<i>Metrosideros</i> spp.	Myrtaceae (Myrtle family)
<a href="#">Norfolk island pine</a>	<i>Araucaria</i> spp.	Araucariaceae (Araucaria family)
<a href="#">Oak</a>	<i>Quercus</i> spp.	Fagaceae (Beech family)
<a href="#">Oleander</a>	<i>Nerium oleander</i>	Apocynaceae (Dogbane family)
<a href="#">Olive</a>	<i>Olea europaea</i>	Oleaceae (Olive family)
<a href="#">Orchid tree</a>	<i>Bauhinia</i> spp.	Fabaceae (Pea family)
<a href="#">Oregon grape</a>	<i>Mahonia</i> spp.	Berberidaceae (Barberry family)
<a href="#">Oregon myrtle</a>	<i>Umbellularia californica</i>	Lauraceae (Laurel family)
<a href="#">Ornamental pear</a>	<i>Pyrus</i> spp.	Rosaceae (Rose family)
<a href="#">Palm</a>	Many species	Arecaceae (Palm family)
<a href="#">Palmetto palm</a>	<i>Sabal palmetto</i>	Arecaceae (Palm family)
<a href="#">Palo verde</a>	<i>Cercidium</i> spp.	Fabaceae (Pea family)
<a href="#">Paperbark</a>	<i>Melaleuca</i> spp.	Myrtaceae (Myrtle family)
<a href="#">Pepper tree</a>	<i>Schinus molle</i>	Anacardiaceae (Sumac family)
<a href="#">Pepperwood</a>	<i>Umbellularia californica</i>	Lauraceae (Laurel family)
<a href="#">Persimmon</a>	<i>Diospyros</i> spp.	Ebenaceae (Ebony family)
<a href="#">Photinia</a>	<i>Photinia</i> spp.	Rosaceae (Rose family)
<a href="#">Pindo palm</a>	<i>Butia capitata</i>	Arecaceae (Palm family)
<a href="#">Pine</a>	<i>Pinus</i> spp.	Pinaceae (Pine family)
<a href="#">Pittosporum</a>	<i>Pittosporum</i> spp.	Pittosporaceae (Pittosporum family)
<a href="#">Podocarpus</a>	<i>Podocarpus</i> spp.	Podocarpaceae (Podocarpus family)
<a href="#">Pongamia</a>	<i>Pongamia pinnata</i>	Fabaceae (Pea family)

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## Oak—*Quercus* spp. Family Fagaceae (Beech family)

### Plant identification

Oaks are deciduous or evergreen trees with acorns.

### Optimum conditions for growth

Oaks grow in various climatic zones and do well in full sun.



Leaves of valley oak

© 1995 Br. Alfred Brousseau, Saint Mary's College of California



Fall color of pin oak

## Pests and disorders of *Quercus* spp.

### Invertebrates

- [Acorn moth](#)
- [Aphids](#)
- [Armored scales](#)
  - Obscure scale
- [Bark beetles](#)
  - Ambrosia beetles
  - Oak bark beetles
- [Carpenterworm](#)
- [Clearwing moth borers](#)
  - Sycamore borer
- [Filbertworm, filbert weevil, and acorn moth](#)
- [Flatheaded borers](#)
  - Flatheaded apple tree borer
  - Goldspotted oak borer (5 MB, PDF)
  - Oak twig girdler
  - Pacific flatheaded borer
- [Foliage-feeding caterpillars](#)
  - California oakworm
  - Fruit tree leafroller
  - Tent caterpillars
  - Tussock moths
- [Foliage miners](#)
  - Leafminers
  - Oak ribbed casemaker
  - Shield bearers
  - Skeletonizers
- [Fuller rose beetle and Live oak weevil](#)
- [Gall and blister mites](#)
  - Live oak erineum mite
- [Gall makers](#)
  - California gallfly
  - Cynipid gall wasps
  - Ichneumonid wasps
  - Jumping oak gall wasp
  - Twohorned oak gall wasp
- [Glassy-winged sharpshooter](#)
- [Mealybugs](#)

### Invertebrates (cont.)

- [Roundheaded borers](#)
  - Roundheaded oak twig borer
- [Soft scales](#)
  - Kermes scales, black-punctured kermes
  - Oak lecanium scale
- [Spider mites](#)
  - Sycamore spider mite
- [Treehoppers](#)
  - Oak treehopper
- [Whiteflies](#)
  - Crown whitefly
  - Gelatinous whitefly
  - Stanford whitefly
- [Woolly aphids](#)
  - Woolly oak aphid

### Diseases

- [Anthracnose](#)
- [Armillaria root rot](#)
- [Canker diseases](#)
  - Hypoxylon canker
  - Nectria canker
- [Drippy oak acorns](#)
- [Foamy canker](#)
- [Oak branch dieback](#)
- [Oak leaf blister](#)
- [Oak twig blight](#)
- [Powdery mildew/Witches' broom](#)
- [Root and crown rots](#)
- [Rusts](#)
- [Sudden oak death](#)
- [Wetwood](#)
- [Wood decay](#)

### Environmental disorders

- [Leaf burn](#)
- [Leaf scorch](#)
- [Mineral deficiencies](#)

## How to Manage Pests

### Pests in Gardens and Landscapes

## Powdery Mildew on Ornamentals

Revised 4/09



#### In this Guideline:

- [Identification and damage](#)
- [Life cycle](#)
- [Management](#)
- [About Pest Notes](#)
- [Publication](#)
- [Glossary](#)

Powdery mildew is a common disease on many types of plants and is prevalent under the diverse conditions that cause disease on different plants. These fungi tend to infect either plants in the same family or only one

### IDENTIFICATION AND DAMAGE

You can recognize this disease by the white, powdery mycelial and spore growth that forms on [leaf surfaces](#) may infect new or old foliage. This disease can be serious on woody species such as rose, crape myrtle, [flowers](#), and leaves. New growth may be [dwarfed](#), distorted, and covered with a white, powdery growth. [Healthy leaves](#).

### LIFE CYCLE

All powdery mildew fungi [require living plant tissue to grow](#). On perennial hosts such as roses, powdery mildew forms buds or as spherical fruiting bodies, called [chasmothecia](#), on the bark of branches and stems.

Most powdery mildew fungi grow as [thin layers of mycelium](#) on the surface of the affected plant parts. Spores have a powdery appearance of this fungi and are produced in chains on upper or lower leaf surfaces or on flower parts. This fungal disease that produces visible powdery growth, has spores that grow on [branched stalks](#) and look like a fine powder on leaf surface. Environmental conditions that favor the growth of downy mildew are different from those that favor the growth of powdery mildew, which require a relative humidity of 90% or higher, and free moisture.

Wind carries powdery mildew spores to new hosts. Although relative humidity requirements for germination are low, the absence of free water. In fact, water on plant surfaces for extended periods inhibits germination and kills spores. Temperatures of 60° to 80°F and shady conditions generally are the most favorable for powdery mildew development. Powdery mildew is killed by sunlight, and leaf temperatures above 95°F may kill the fungus.

### MANAGEMENT

The best method of control is prevention. Avoiding the most susceptible cultivars, placing plants in full sun, and avoiding mildew in many situations. Some ornamentals do require protection with fungicide sprays if mildew conditions are severe on crape myrtle. (See Table 1.) For a list of other common ornamentals susceptible to powdery mildew, see Table 2.

**Table 1. Host Plants and Control Measures for Powdery Mildew Species.**

Fungus species	Hosts
<i>Gaiovinomyces cichoracearum</i>	begonia, Composite family (chrysanthemum, dahlia, phlox, sunflower, and zinnia)
<i>Erysiphe lagerstroemiae</i>	crape myrtle
<i>Sphaerotheca pannosa</i>	rose

**Table 2. Common Ornamentals Susceptible to Powdery Mildew.**

Common Name	Scientific Name	Susceptible
aster	<i>Aster</i>	crape myrtle
azalea (deciduous)	<i>Rhododendron</i>	dahlia

# Cenicilla

**Puntos de un blanco cenizo en las hojas y brotes pueden ser señal de cenicilla.** Esta enfermedad afecta muchas plantas y puede ser causada por diferentes tipos de hongos. Para combatir la cenicilla use variedades de plantas resistentes a este hongo y altere el ambiente en que crecen. En algunos casos, ciertas especies de plantas susceptibles a estos hongos requerirán tratamiento con fungicidas.

### Los síntomas pueden variar de una especie a otra.

- Use piedra lisa o baldosas, adoquines o concreto permeable para senderos y patios en lugar de superficies impermeables como el concreto y asfalto.
- Las hojas se tornan amarillentas o café y se caen, exponiendo a la planta o fruto a las quemaduras del sol.
- En algunos casos, las hojas o los brotes se tuercen o distorsionan.
- Las frutas y verduras usualmente no se ven afectadas, pero los manzanos, vid y otras frutas con hueso pueden desarrollar unas marcas rojizas en forma de telaraña o áreas suberosas.

### La cenicilla es común en condiciones cálidas y secas.

- A diferencia de muchas enfermedades, la cenicilla no necesita de condiciones húmedas para desarrollarse y su crecimiento es inhibido por el agua en la primavera.
- Las temperaturas moderadas (60°F a 80°F) y la sombra favorecen el desarrollo de la enfermedad.

### Haga a las plantas menos susceptibles alterando el ambiente en el que crecen.

- Cultive las plantas en sitios soleados.
- Poda el exceso de follaje para permitir el paso del aire.
- No fertilice en exceso con nitrógeno ya que el follaje frondoso y la sombra favorecen a la enfermedad.

### Plante variedades resistentes.

Las variedades de plantas muy susceptibles que son resistentes o menos susceptibles, incluyen:

- Las ornamentales: mirto, rosa, platanero, rododendro y zinnia.
- Frutas: manzano, duraznero y frambuesa.
- Verduras: melones, calabazas, pepinos, frijoles y chícharos.



### Considere usar métodos sin el uso de materiales químicos.

- Rocíe las plantas infectadas con agua. Para prevenir problemas con otras enfermedades, haga esto a media mañana para que se sequen rápidamente. Agregue un poquito de jabón al agua para puede aumentar la efectividad.
- Durante la temporada en la que no se produce fruto, corte las partes y los brotes que muestren una infección leve. Asegúrese de sacar de su jardín cualquier material infectado para que las esporas no se esparzan a nuevas áreas.

### Las variedades susceptibles de algunas plantas pueden requerir el uso de fungicidas.

- Las plantas que requieren de tratamiento con mayor frecuencia son los manzanos, zarzamora, vid, rosales y cucurbitáceas.
- Controle las infecciones leves a moderadas de la cenicilla usando aceite de horticultura o aceites a base de plantas como el de árbol de neem o de jojoba, o fungicidas a base de bicarbonato de sulfuro. No aplique los aceites en donde haya usado bicarbonato de sulfuro o cuando la temperatura rebase los 90°F.
- Prevenga las infecciones usando sulfuros solubles en agua, en especial los que vienen listos para usarse y formulados con agentes tensoactivos parecidos al jabón. Estos productos son ineficaces si se aplican cuando la infección ya ha aparecido. Podría ser necesario repetir la aplicación.
- Existen otros fungicidas para otros tipos de plantas, pero la mayoría se deben aplicar antes de que aparezcan los primeros brotes de la enfermedad.

Para mayores detalles en inglés, vea [Pest Notes: Powdery Mildew on Fruits and Berries](#), [Powdery Mildew on Ornamentals](#), and [Powdery Mildew on Vegetables](#) a [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu), o visite las oficinas de Extensión Cooperativa.



Reduzca al mínimo el uso de pesticidas que contaminan nuestros canales. Utilice alternativas sin químicos o productos pesticidas menos tóxicos siempre que sea posible. Lea las etiquetas de los productos cuidadosamente y siga las instrucciones sobre el uso, almacenamiento y desecho correcto.

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**¡Lo que usted usa en sus paisajes afecta nuestros ríos y océanos!**

# UC IPM

- Environmental themes mentioned in management section
- Many other treatment options too
- Cultural and design options a good starting point
  - Especially if you can cure more than one problem

All powdery mildew fungi require living plant tissue to grow. On perennial hosts such as roses, powdery mildew survives from one season to the next as vegetative strands in buds or as spherical fruiting bodies, called chasmothecia, on the bark of branches and stems.

Most powdery mildew fungi grow as thin layers of mycelium on the surface of the affected plant parts. Spores, which you can see with a hand lens, are part of the white, powdery appearance of this fungi and are produced in chains on upper or lower leaf surfaces or on flowers, fruits, or herbaceous stems. In contrast, downy mildew, another fungal disease that produces visible powdery growth, has spores that grow on branched stalks and look like tiny trees. Also, downy mildew spores occur mostly on the lower leaf surface. Environmental conditions that favor the growth of downy mildew are different from those that favor powdery mildew and include low temperatures of 50° to 70°F, a relative humidity of 90% or higher, and free moisture.

Wind carries powdery mildew spores to new hosts. Although relative humidity requirements for germination vary, all powdery mildew species can germinate and infect in the absence of free water. In fact, water on plant surfaces for extended periods inhibits germination and kills the spores of most powdery mildew fungi. Moderate temperatures of 60° to 80°F and shady conditions generally are the most favorable for powdery mildew development. Powdery mildew spores and mycelium are sensitive to extreme heat and sunlight, and leaf temperatures above 95°F may kill the fungus.

## MANAGEMENT

The best method of control is prevention. Avoiding the most susceptible cultivars, placing plants in full sun, and following good cultural practices will adequately control powdery mildew in many situations. Some ornamentals do require protection with fungicide sprays if mildew conditions are more favorable, especially susceptible varieties of rose and crape myrtle. (See Table 1.) For a list of other common ornamentals susceptible to powdery mildew, see Table 2.

Table 1. Host Plants and Control Measures for Powdery Mildew Species.

Fungus species	Hosts	Control
<i>Golovinomyces cichoracearum</i>	begonia, Composite family (chrysanthemum, dahlia, phlox, sunflower, and zinnia)	water
<i>Erysiphe lagerstroemiae</i>	crape myrtle	resist
<i>Sphaerotheca pannosa</i>	rose	resist neces

Table 2. Common Ornamentals Susceptible to Powdery Mildew.

Susceptible Plant		Control
aster	crape myrtle	oa
azalea (deciduous)	dahlia	pa
begonia (tuberous)	delphinium	ph
calendula	euonymus	ra
California poppy	forget-me-not	ro



# Botryosphaeria (Diplodia)

- Opportunistic
- Huge host range
  - Oaks (Diplodia)
  - Redwoods, Sequoias, other conifers (Botryosphaeria)
  - Madrone, Manzanitas
  - ... and on ...
- Improve growing conditions
- Consult UC IPM

# Phytophthora

- Many species thrive in warm, wet soil
  - e.g., *P. cinnamomi*
  - Many more being discovered
  - Most of these are primary
- All require water to infect
- Thrive in “Drench and Drought” irrigation
  - Know your plants
  - Monitor your soil
  - Let things dry without stressing the plant







# Armillaria (oak root rot)

- Opportunist > Primary
- Common in California soils
- Likes:
  - Summer irrigation
    - Consistently warm moist conditions
    - Droughts, hot summers
    - Vineyards
    - Lawns
  - Injured roots
    - Especially larger roots
- Fungicides ineffective

# Armillaria

- “Oak Root Rot”
- White mycelia
- Usually bark is soft where disease is advanced
- Smells like fresh mushrooms
  - Often subtle
- Sometimes clumps of tan mushrooms
  - White spores







# Beetles that attack oaks

- Bark & ambrosia beetles
  - Pin-sized boring holes
  - Talcum-fine boring dust
    - Wood colored
      - (ambrosia beetle)
    - Rust colored
      - (oak bark borer)



# Ambrosia beetle

- California native
- Farms the *Ambrosiella* fungus
- They kill drought stressed oaks
- No curative treatment





# Ambrosia beetle

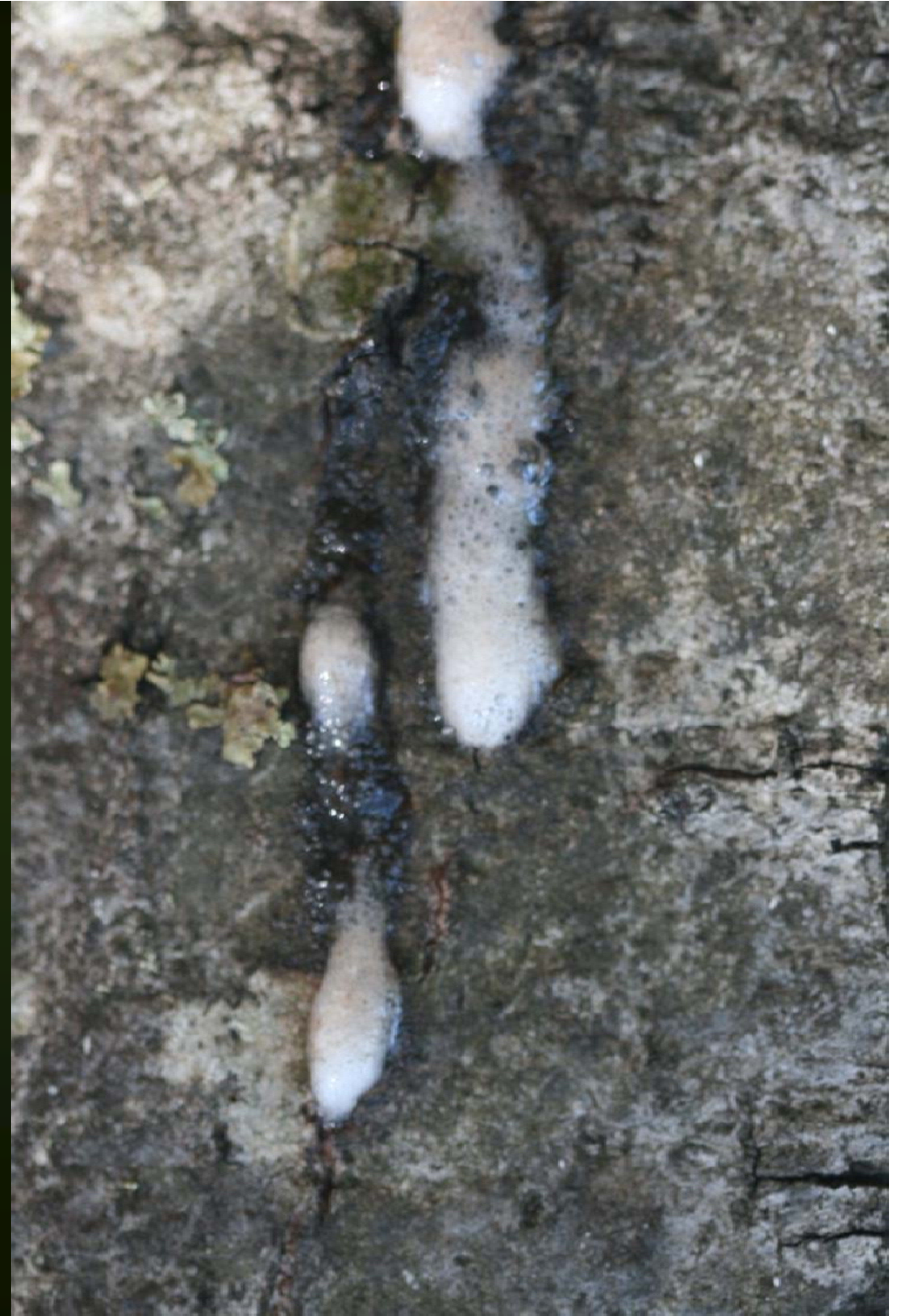
- The last part of SOD
- Don't need *Phytophthora* to kill trees
  - See and smell drought stress
    - Outbreaks in low rainfall years
    - Deep, infrequent summer water
    - Preventative pyrethroid insecticides





# Oak bark beetle

- Similar lifecycle to oak bark beetles
  - See and smell drought stress
    - Outbreaks in low rainfall years
    - Deep, infrequent summer water
    - Preventative pyrethroid insecticides
- Feed on living cambium



# Oak bark beetle

- Tunnels may flux
  - New fungal associate  
*Geosmithia pallida*
  - Similar to alcohol flux
    - May be deadlier
  - Check origin of foam
    - Tunnel: Oak bark beetle



# Conifers and beetles

- Monterey pine
  - Five spined Ips
    - Ips paracofusus*
      - Attack higher in the canopy
      - Distinctive Y shaped galleries
    - Red turpentine beetle
      - Dendroctonus valens*
        - Red tunnel entrances at tree base
          - Turn white with age
  - Provide summer water





# Conifers and beetles

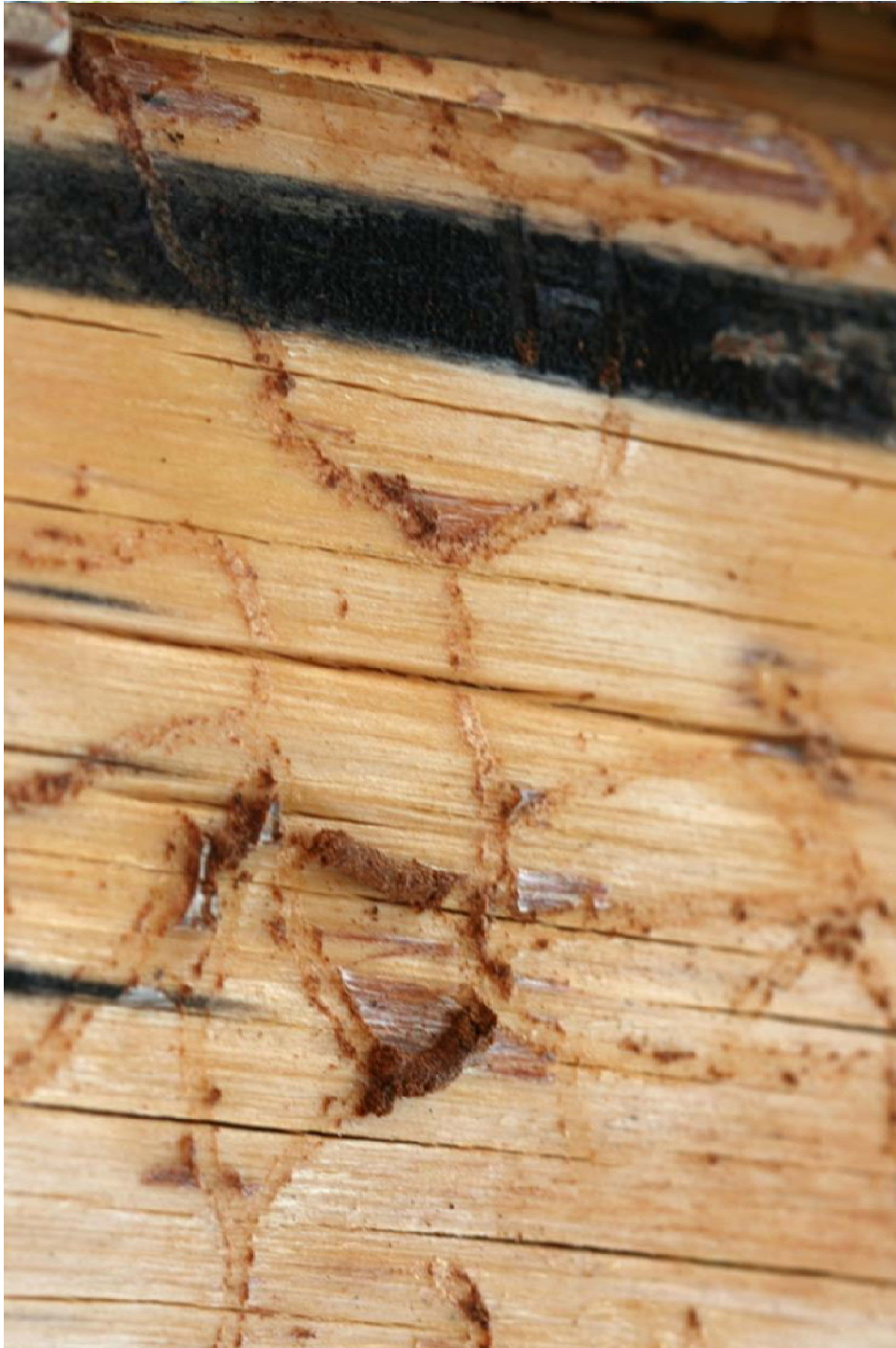
- Monterey pine
  - Red turpentine beetle  
*Dendroctonus valens*
    - Red tunnel entrances at tree base
      - Turn white with age
  - Five spined Ips  
*Ips paracofusus*
    - Attack higher in the canopy
    - Distinctive Y shaped galleries
- Provide summer water
- Mulch / compost



# Conifers and beetles

- Douglas fir invades oak woodlands in normal years
  - Saplings don't require a lot of water
  - Big trees do





# Conifers and beetles

- Douglas fir engraver  
*Dendroctonus brevicornis*
  - Attacks Douglas fir on sub-optimal sites
  - Outbreaks occur in dry years
  - Almost routine occurrence in California
  - Natural stand-in for fire



# Polyphagous shot hole borer

- As far north as Ventura
- Kills many tree species
  - Coast live & black oak
  - Sycamore
  - Boxelder and maple
  - Cottonwood & willows
  - White alder
  - Wisteria and ...
- Don't move firewood
- Report suspected finds
- More info:
  - [http://ucanr.edu/sites/socaloakpests/Polyphagous\\_Shot\\_Hole\\_Borer/](http://ucanr.edu/sites/socaloakpests/Polyphagous_Shot_Hole_Borer/)



# Asian Citrus Psyllid (ACP)

- Head down pose
- Curlycue wax filaments
- Carries Huanglongbing (HLB) disease
- HLB kills citrus
- ACP found recently in Pacifica / S. S.F.
- Report immediately
- More info:

<http://www.ipm.ucdavis.edu/PMG/C/D-CI-CAND-FF.001.html>



# Citrus leafminer

- Only attacks young leaves
- Winding tunnels with clear “film”
- Inconspicuous larvae
- Parasites are here
- More info:

<http://www.ipm.ucdavis.edu/PMG/r107303211.html>



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# Management Recommendations

- Assess water status 12" below grade
  - Hydraulic lift
- Let the tree tell you how it's doing
  - Look at current growth
  - Effects occur over years
  - A tree is the physical manifestation of a dance between its genes, the environment, and time

# Thanks!

- UC IPM: <http://www.ipm.ucdavis.edu/>
- Presentation on-line at:
  - <http://ucanr.edu/MarinIPM>
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