

Palm Disease Basics

CEU Category: O & T, Ltd L&O, Ltd Comm Maint, Private, Comm L&O

Estimated study time: one hour

Course Objectives: Upon completion of this module, students will understand basic biology and available methods of control and prevention of several common palm diseases.

Outline:

- Ganoderma Butt Rot
- Lethal Yellowing
- Fusarium Wilt
- Leaf spots
- Bud rot

Note: Highlighted word refer to definitions located at the end of the class. The review may include questions relating to the definitions.

While palms grown in the landscape may appear carefree, they are **susceptible** to many **diseases**. This article will cover some of the more common palm diseases.

Ganoderma Butt Rot

Ganoderma is a lethal and incurable disease affecting an increasing number of palms in Florida, especially southern Florida. It affects mature palms and is caused by a **fungus**, *Ganoderma zonatum*. Research on this disease began in 1994. The disease is normally concentrated in the lower 4-5 feet of trunk. The fungus moves from the center of the tree to the outside. There is currently no method for preventing the disease or for curing the disease once the palm is infected. There are no fungicides that will prevent or cure this disease.



Queen palm dying from Ganoderma. Photo by M L Elliot

Symptoms - Early symptoms include withering and drooping of older fronds. Fronds collapse and droop parallel to the trunk. They do not break off but are retained on the palm. New growth slows, and becomes pale green or yellow in color. Other symptoms



Cross sections of trunk showing wood rotting and disease progression pattern.

Photo by M L Elliot

may include liquid 'bleeding' which stains the trunk and the formation of a 'conk' or bracket fungus. Conks are shelf-like structures that protrude from the tree on the lower trunk. There is currently no method to determine if a palm is infected with *Ganoderma* until the conk forms. Once conks are produced on a palm, there are no known methods for stopping the fungus. The area where conks appear does not indicate where the fungus entered the palm. Instead, they indicate that the fungus has reached the outside of the palm. Conks can be formed at any time of the year. At first,

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the conk is a soft, white, usually circular "blob" on the tree. It will initially be flat against the tree. As it develops, it starts to extend itself outwards as a shelf, but it is still very white and soft. Older conks may be kidney shaped and are usually hard and woody with rings. When the conks mature, the outer edge becomes swollen where spores are produced. The conk releases **spores** very early in its development. Millions of rust-colored spores are released from one conk. These spores act like tiny seeds and are easily spread to healthy palms by wind.

Later symptoms may include trunk collapse or in some cases, the head of the infected palm may fall off. Depending on the point of invasion, the roots may be severely decayed. Outer trunk tissues may seem solid, but affected palms have a hollow sound when tapped. Palm death can take place 6 to 12 months after symptoms are observed, or it may take three to four years for the palm to die, depending on the age of the tree and environmental conditions.

Prevention and Treatment Because there is no known cure for *Ganoderma*, the first step in preventing the infection from reaching other palms is to immediately cut down the palm. If at all possible, remove and destroy as much of the stump and root system as possible. Burning, or incineration is the only way to destroy the fungus. If the stump is not removed, watch for production of conks on the stump and remove them as soon as you see them start to form. Simply remove them, place in a plastic bag and place the bag in garbage that is going to a landfill or incinerator. Research indicates that the fungus is restricted to the lower portion of the trunk, so the disposal method of choice would be to incinerate at least the lower portion of the palm and the stump.

Replacement - The infected palm should not be replaced with another palm. The *Ganoderma* fungus present in the soil will probably infect a new palm. If installation of another palm is required, remove the old soil and bring in fresh soil, although there is no guarantee that the new palm will not become infected. Soil **fumigation** has not been shown to eliminate the fungus, as it can survive within bits of wood or decayed roots in the soil. No other plants are affected by the fungus. At this time no palm species is considered **resistant** to *Ganoderma*.



Ganoderma will readily colonize and degrade palm stumps or dead palm trunks. Photo by M L Elliot

Prevention Avoid injuries to the trunk and roots especially during installation and maintenance activities. Periodic observation, quick removal and proper disposal of infected palms are the primary methods of preventing *Ganoderma* from spreading. Watch other dead palm stumps carefully. *Ganoderma* will colonize them.

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FIG. 1

The third stage symptoms of Lethal Yellowing. Photo by Richard Illingworth.

Lethal Yellowing

Lethal yellowing (LY) is a relatively new plant disease that infects and kills many palms including coconut palms. Known since the 1800's in the western Caribbean, LY was diagnosed in Key West, Florida in the 1950's and appeared on the Florida mainland in Miami in 1971. It quickly became evident that LY affected many palm species in addition to the coconut palm.

By 1983, the epidemic had destroyed an estimated 100,000 coconut palms and thousands of palms of other species. In the late 1980's, LY appeared on the southwestern coast of Florida near Fort Myers and remains highly active. LY was diagnosed for the first time in Mexico in the 1982 on the Yucatán Peninsula. Since then it has spread killing hundreds of thousands of coconut palms and destroying the locally important coconut industries.

Symptoms - In coconut palms, four symptom stages for LY occur. The first symptom is premature dropping of most or all coconuts, regardless of size. The second stage, is the blackening of new flower stalks. In the third symptom stage, from which the disease gets its name, the fronds turn yellow, usually beginning with the oldest fronds and advancing upward through the crown. Death of the bud occurs about halfway through the yellowing sequence. Finally the top of the tree falls away leaving a bare trunk or "telephone pole." Infected trees usually die within 3-6 months after appearance of the first symptoms. Recognition of symptoms of the LY-like disease in other palms is more difficult. The first two symptom stages are the same as for the coconut palm-the premature dropping of fruit and the blackening of the flower stalks. The third symptom, in many cases the first obvious sign of a disorder, is discoloration of the fronds. At this stage of the infection the symptoms differ for individual species.



FIG. 3

***Myndus crudus*, vector of LY in Florida.**

Photo by James V. De Filippis.

Because diseases of palms are difficult to diagnose, lab diagnosis of suspected LY is recommended to confirm the presence of LY.

Cause, Prevention and Treatment Mycoplasma-like-organisms (MLO's) are responsible for causing LY. A planthopper identified as *Myndus crudus* has been shown to transmit the MLO to the palms. Insecticides can slow the spread of LY but the difficulty of use on tall palms and the potential health risks of widespread pesticide use discouraged

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their use. Biological methods of controlling the **vector** are currently being investigated. Palms resistant to the disease are also being researched.



Early Fusarium symptoms on Canary Island Date Palm
photo by Ken Pfalzgraf

Fusarium Wilt

Fusarium is a disease which clogs the water transport system in plants, causing wilt. In plants, water is pulled from the soil by the roots and into the leaves by a process called **transpiration**. The water evaporates from the leaves cooling the plant. The water moving from the roots also carries nutrients. When the transport system, also known as the **xylem**, is clogged, the ability of the plant to cool itself and transport nutrients is reduced. As the transport system becomes increasingly clogged, the plant begins to wilt and may show nutrient deficiencies. Palms cannot repair damaged tissue, so once a palm is infected, the disease is eventually fatal. No treatment strategies are available.

The organism, *Fusarium oxysporum* causes the disease in palms. *Fusarium* is specific to the Phoenix family of palms. There are, however several strains of the disease. One strain is specific to Canary Island Date Palms (*Phoenix canariensis*) another to (*Phoenix reclinata*). Another strain, not as lethal, affects the edible Date Palm (*Phoenix dactylifera*). This **pathogen** has not been known to invade *Phoenix roebelenii*. The pathogen is both soil and water borne.

Symptoms

Palms affected by *Fusarium* wilt exhibit a general decline. Affected palms exhibit reduced vigor early in the disease cycle. Most symptoms show up on the fronds. There are four key symptoms necessary for a field diagnosis of *Fusarium* wilt disease:

1. Older fronds decline, brown and die in unusual patterns. Usually from the trunk toward the tip of the frond, usually on one side of the spine (**rachis**) of the frond, then progress back toward the trunk on the other side of the spine.
2. Fronds die in this manner from older fronds (lower on the trunk) to newer fronds (higher on the trunk).
3. A prominent brown stripe on the spine of the frond (rachis) starting at the trunk and extending out a variable distance toward the tip of the frond.
4. When a striped frond is removed, discolored **vascular bundles** are seen at the cut end.

Other insects and diseases may somewhat obscure the symptoms.



Later stage of Fusarium infection. Photo by Ken Pfalzgraf

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Prevention & Management

Management of this disease begins with prevention. When purchasing plants, try to inspect stock prior to purchase. Evaluate palms for key symptoms. If palms are exhibiting decline symptoms, an alternative palm supplier would be in order.

The potential management of *Fusarium* wilt on Canary Island date palms is dependent upon rapid and accurate diagnosis. Failure to properly identify this disease will result in a slow but steady spread of this fungus in the immediate area. Misidentification of *Fusarium* wilt will result in the unnecessary destruction of an expensive palm. Palms need to be examined on a regular basis for symptoms. Suspected palms should be sampled and sent to a lab for verification.

For proper laboratory verification of *Fusarium* wilt of Canary Island date palm, collect 3-4 **petiole** bases from fronds exhibiting either one-sided leaflet death or tip dieback and the lower brown striping of the rachis. If only 1-2 fronds have clear symptoms, remove a symptom-less lower and upper frond as well. Remove the lower 12-18 inches of each frond and remove the spines before packaging. If several trees have symptoms, disinfect loppers or pruning saws between palms.

Fusarium does not have an airborne spore stage. The spread of this disease depends on the movement of infected trees, infested soil, or poor maintenance practices.

Infected palms should be carefully removed from the landscape. Avoid scattering infested soil. These trees should be taken to the landfill or incinerated rather than being taken to a recycling program. Clean the tools used in palm removal with bleach or rubbing alcohol. Leave the infested site fallow or replant with a non-palm species. Replanting with a palm is risky in infested soil. Use of soil fumigants is not likely to eradicate this fungus from the site.

Pruning of palms can introduce the fungus either directly from the saw blade or by fungus-infested saw dust between pruning saw teeth or lopper blades. One method in controlling the spread of *Fusarium* is to use several pruning saws or loppers. Use one tool on each tree. Disinfect the tools between uses with either a 1:1 ratio of bleach in water or undiluted rubbing alcohol. Do not use chain saws on trees affected by *Fusarium* due to the difficulty of sterilization.

Prune only dead fronds to minimize the risk of fungus movement. Although Canary Island date palms are severely pruned in the "hurricane cut" at the time of installation to promote establishment, this severe pruning style should be discontinued once the palm is established. Maintenance personnel should be alert to the key symptoms of *Fusarium* wilt.

Leaf Spots

Palms are commonly affected by many leaf-spotting fungi. Leaf spots can be circular to elongated, brown and possibly oily in appearance. It is difficult to diagnose the leaf-spotting fungi by visual symptoms alone. In most cases, leaf spots will not kill the tree. Fungicides are usually not necessary but can be applied as a preventative control. These diseases may occur on palms that have been under some form of environmental stress such as flooding, drought, or damage from maintenance equipment. Eliminating the stress often ends the problem. Select a fungicide containing copper hydroxide or copper salts of fatty acids. Use a spreader-sticker for good coverage. Apply all chemicals according to directions on the label.

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There are many other palm diseases. Listed above are only a few. An excellent reference is *Diseases and Disorders of Ornamental Palms* by A.R. Chase and T. K. Broschat.

Definitions

disease - A plant is diseased when its chemistry or structure has been altered in a continuous way. This definition tells us that a leaf pulled off a tree is not a disease but instead an injury because the alteration is not continuous. A fungus, bacterium or virus, on the other hand, enters a plant and continues to deprive the plant of nourishment. It continuously alters normal functions of the plant. The lack of normal functions over a period of time results in a plant with undesirable symptoms.

fumigation - partial sterilization of the soil, usually with a gas like methyl bromide

fungus - (plural is fungi) Fungi are plants that lack chlorophyll, stems, leaves, and roots. An organism that lacks chlorophyll, has a vegetative body consisting of hyphae (microscopic threadlike filaments) or plasmodia (an amorphous, jelly-like slime) or budding cells (the yeasts), and usually has the potential to form spores. Beneficial and harmful fungi exist.

pathogen - an infectious organism, generally a fungus, bacterium, protozoan, or virus that causes disease.

petiole - the base of a palm frond

rachis - the spine of a palm frond

resistant - unresponsive to

spores - A reproductive body, often consisting of a single cell. Typically distributed by air currents, they can also be spread by insects, birds, machinery and even on clothing.

susceptible - responsive to

transpiration - the loss of water in a plant, usually by evaporation. Plants cool themselves through transpiration.

vascular bundles - bundles of tissue (tubes) inside a plant that move fluids

vector - an organism (as an insect) that transmits a pathogen

xylem - tissue specialized for the transport of water and minerals upward through the plant.

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References

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Lethal Yellowing of Palms - F.W Howard and Nigel A. Harrison,

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Lethal Yellowing of Palm Trees in Florida, Henry Donselman,

<http://www.floridaplants.com/horticulture/ly.htm>

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Palm Trees And *Fusarium*, Ken Pfalzgraf,

<http://homestead.juno.com/palmdr/PalmTrees.html>

Diseases and Disorders of Ornamental Palms, A.R. Chase and T. K. Broschat (Ed), 1991

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<http://primera.tamu.edu/pubs/palmdis.html>

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Review

The majority of these questions are answered, or at least referenced, in the text. In some cases you may be asked to use your experience and knowledge to answer questions that may not appear exactly in the text. The purpose of these questions is to allow each student to increase the learning experience in their own unique way.

Complete the following review. Completion of the review is required to qualify for CEU's. DACS requires that you spend 50 minutes reading the text and answering the review questions. After you complete the class please sign the statement below:

I _____ (print your name), have spent at least 50

minutes studying this class. _____ (Your signature here)

1) *Ganoderma* is caused by a: (Circle one)

bacteria nematode fungus virus

2) *Ganoderma* is serious but not lethal. True False

3) Explain what a 'conk' is. _____

4) Name 3 diseases of palms discussed in the CEU class. _____

5) If a conk has rings on it, what does it mean? _____

6) What are spores? _____

7) *Ganoderma* starts at the outside of the palm and moves in. True False

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8) An important step in determining whether a palm has *Ganoderma* is to take a sample and send to a lab for testing. True False

9) Replacing a palm that died of *Ganoderma* with another palm is not a good idea. Why?

10) *Ganoderma* will colonize other palm stumps. True False

11) Lethal Yellowing affects only coconut palms. True False

12) Palm flower stalks that turn dark brown or black should raise suspicions of what disease?

13) Lethal Yellowing is caused by :
virus fungus bacteria nematodes MLO's

14) Which insect carries the disease that causes Lethal Yellowing?

15) The stages of Lethal Yellowing are fairly distinct in coconut palms. Put the stages in the correct order by drawing a line between the disorder and the correct stage.

1 st stage	Death
2 nd stage	Dropping of most or all coconuts
3 rd stage	Blackening of flower stalks
4th stage	Yellowing of fronds

16) Fusarium wilt affects many types of palms. True False

17) If a frond on a Phoenix - type palm begins to die but on only one side of the frond, what disease should you suspect?

Ganoderma Lethal Yellowing *Fusarium* Leaf spot

18) Why is *Fusarium* called a wilt disease? _____

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19) If you suspect *Fusarium*, what is the first thing you should do?

20) *Ganoderma* can spread through the: (circle all that apply)

Air Soil Insects Pruning tools

21) Lethal Yellowing can spread through: (circle all that apply)

Air Soil Insects Pruning tools

22) *Fusarium* can spread through the: (circle all that apply)

Air Soil Insects Pruning tools

23) How can pruning tools be sterilized?

25) What steps can you take to confirm a suspected palm disease?
