

Texas Phoenix Palm Decline¹

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Summary

- Texas Phoenix palm decline is a new disease in Florida. It is caused by a phytoplasma, which is a bacterium without a cell wall.
- The phytoplasma is similar to, but genetically distinct from, the phytoplasma that causes lethal yellowing (LY).
- Texas Phoenix palm decline is a systemic disease, and the phytoplasma is probably transmitted by a planthopper.
- Palms with greater than 25% discoloration or a dead apical meristem (bud) due to this disease should be removed immediately.
- Management of Texas Phoenix palm decline includes trunk injections of oxytetracycline HCl (OTC) every four months, and planting of palm species that are not hosts of this phytoplasma.
- To date, the primary hosts of this phytoplasma are *Phoenix canariensis* (Canary Island date palm), *Phoenix dactylifera* (edible date palm) and *Phoenix sylvestris* (wild date palm).

Introduction

Until recently, the only Florida palm disease caused by a phytoplasma was lethal yellowing (LY). In late 2006, a second phytoplasma disease was confirmed in west-central Florida (Sarasota to Tampa). This disease is called Texas Phoenix palm decline (TPPD), and was first observed in the United States in the southern coastal region of Texas in the late 1970s.

Pathogen and Hosts

Texas Phoenix palm decline is caused by a phytoplasma, an unculturable cell wall-less bacterium. The phytoplasma has been classified as a member of 16S rDNA RFLP group 16SrIV, subgroup D (16SrIV-D). The signature DNA sequence obtained from the diseased *Phoenix* palms in Florida was a perfect match to the signature of a phytoplasma known to cause Texas Phoenix palm decline on *P. canariensis* (Canary Island date palm) in the Corpus Christi area of Texas. DNA analysis has determined the Texas Phoenix palm decline phytoplasma is related to, but genetically distinct from, the one that causes lethal yellowing.

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The phytoplasma is most likely spread by a planthopper, but it is unlikely to be the planthopper *Myndus crudus* that transmits lethal yellowing. In the one insect survey conducted by the Texas Department of Agriculture in the Rio Grande Valley where Texas Phoenix palm decline was active, *Myndus crudus* was rarely found. However, several other candidate planthopper species that could perhaps vector the phytoplasma were found in abundance.

Phytoplasmas are systemic pathogens found only in the phloem tissue (vascular tissue transporting carbohydrates) of plants. They are not known to survive outside either their plant or insect hosts. Planthoppers are piercing-sucking insects that feed on phloem sap, and in doing so acquire the phytoplasma. The insects spread the phytoplasma from plant to plant as they visit different hosts during their feeding activities.

It is not known when the Texas Phoenix palm decline phytoplasma arrived in Florida, but it would have taken considerable time for both the pathogen and vector populations to increase to their present significant levels. The phytoplasma was probably moved from Texas to Florida via an infected insect, as very few, if any, mature Canary Island date palms are moved from southern Texas to Florida.

The presence of the Texas Phoenix palm decline phytoplasma has been confirmed in symptomatic *P. canariensis* (Canary Island date palm), *P. dactylifera* (edible date palm) and *P. sylvestris* (wild date palm) in landscape and field nursery sites in Sarasota County, Manatee County, Pinellas County and Hillsborough County. How far and how quickly Texas Phoenix palm decline will spread (both north, south and inland) is unknown. Since movement of palms occurs widely in Florida, it will not be surprising if people help to spread the disease, unknowingly, by moving vector and infected hosts.

Currently, the known susceptible hosts for the Texas Phoenix palm decline phytoplasma are *Phoenix* species, specifically *P. canariensis*, *P. dactylifera* and *P. sylvestris*, and *Syagrus romanzoffiana* (queen palm). However, thus far, only a few queen palms in only one nursery site have been confirmed with this disease, whereas the disease has been observed widely in *Phoenix* species in a four-county area

(Sarasota, Manatee, Pinellas and Hillsborough Counties). The queen palms were in a *Phoenix* palm grove where Texas Phoenix palm decline was occurring in high frequency. Thus, proximity to high levels of pathogen and vector may account for these diseased queen palms.

Symptoms



Figure 1. Premature fruit drop is an early symptom of Texas Phoenix palm decline. Virtually all the fruit drops at one time.



Figure 2. Death of the inflorescence (flowers) is an early symptom of Texas Phoenix palm decline. This photo also illustrates a dead spear leaf (youngest leaf that has not unfolded), which is tan and not green.

The first obvious symptom on mature palms is premature drop of most or all fruits at one time (Figure 1). This fruit drop occurs within a few days. It is not spread out over a prolonged period of time. Inflorescence (flower) necrosis (death) follows (Figure 2). However, these two symptoms will only be observed if the palm is mature enough to produce fruit, it is the season for flowering and fruiting, and if no one has trimmed the flowers or fruits from the palm.

The next symptom is discoloration of the foliage, beginning with the oldest leaves. The leaves do not turn yellow (or do so briefly), but quickly turn varying shades of reddish-brown to dark brown or gray (Figure 3). The discoloration begins at leaf tips (Figure 4). Unless the palm is being monitored closely, the onset of leaf discoloration is usually first recognized as a greater number of dead older leaves than would be normal for natural senescence. This symptom might be confused with other problems such as early senescence due to nutrient deficiency (e.g., potassium) or *Ganoderma* butt rot. However, if someone is continually removing these dying or dead leaves (nobody likes an untidy palm!), even this symptom may not be obvious.



Figure 3. Discoloration of the lowest (oldest) leaves is an early symptom of Texas Phoenix palm decline.

When less than one-third (and usually less than one-quarter) of the oldest leaves have discolored and become necrotic, the spear leaf dies (Figures 2, 5 and 6). This indicates the apical meristem (bud or heart) has died. Once this has occurred, there will be no further development of new leaves. The remaining leaves continue to discolor from the oldest to the youngest leaves.



Figure 4. Discoloration of the leaves begins at the leaf tips.



Figure 5. *Phoenix sylvestris* exhibiting symptoms of Texas Phoenix palm decline. Note there are more dead lower leaves than would be normal for a healthy palm. Also, the spear leaf (youngest leaf that has not unfolded) is tan and not green.

Often by the time the spear leaf dies, mature roots of palms at or near the soil surface are soft in texture and are easily broken. The palm can be easily rocked back and forth in the ground because the root system is decaying. This symptom is not typical for palms affected by lethal yellowing.



Figure 6. Close-up of dead spear leaf in Figure 5.

It may not always be obvious when a spear leaf has died. *Phoenix* species have numerous leaves surrounding the spear leaf. Unless you see the spear leaf is dead (Figure 2 and 5) or find it hanging from the canopy (Figure 7) or on the ground, you will probably need to physically examine the canopy up close to determine if a healthy spear leaf is present or not (Figure 8). Also, we have observed that the young spear leaf of Phoenix palms is often enclosed in a sheath that is brown and very thin (it tears like paper). Do not confuse this brown sheath for a dead spear leaf.

Two juvenile queen palms have been diagnosed with the Texas Phoenix palm decline phytoplasma. Extensive root decay early in disease development was a common symptom to both palms. Leaf necrosis was exhibited on the lowest leaves first and continued upward through the canopy. It is not yet clear when the spear leaf dies. The symptoms observed were distinctly different from *Fusarium* decline, another new disease of queen palms. See http://flrec.ifas.ufl.edu/palm_prod/pdfs/New-Disease-



Figure 7. Note the spear leaf has died and is hanging down from the canopy of this *Phoenix sylvestris* affected by Texas Phoenix palm decline.



Figure 8. The spear leaf has already died in this *Phoenix sylvestris*, and it has already broken off from the canopy. Unlike Figures 5-7, without a close examination of the bud, it would not be apparent that the spear leaf had died.

Queen-Palms-Mexican-Fan-Palms-July.pdf for information on this disease.

Diagnosics

Initial diagnosis is based on the palm symptoms described above. Since the phytoplasma is not culturable, a molecular diagnostic test is used to confirm the presence of the pathogen. If pathogen confirmation is necessary, contact your local county Extension office (<http://solutionsforyourlife.ufl.edu/map>) for information on sample submission and cost of laboratory diagnosis. This information is also located on the FLREC web site (<http://flrec.ifas.ufl.edu/pdfs/LY-TPPD-Trunk-Sampling.pdf>). Sampling is accomplished by boring into the trunk – this requires a drill with a long, large diameter drill bit. Do not obtain samples without first

obtaining the complete set of instructions. The quality of the sample is critical for an accurate diagnosis.

It is currently not known how early in the disease cycle the phytoplasma can be detected via trunk tissue sampling. It is not detectable in palms that are not exhibiting symptoms. In other words, it is not possible to determine if a palm has been infected by the phytoplasma prior to symptom development. The phytoplasma may not be detectable until the spear leaf dies. The molecular test is probably best used to confirm the presence of the disease in a nursery or community in order to devise a management program for remaining susceptible *Phoenix* palms.

Disease Management

If the spear leaf has died, the palm should be removed as soon as possible. Death of the spear leaf indicates the apical meristem (bud) has died, so no new growth will occur. Although lower leaves may remain green for a number of months after the spear leaf dies, it is in the best interest of the nursery grower or the community to remove this infectious palm as soon as possible. The diseased palm serves as a source of the phytoplasma that can be transmitted to healthy *Phoenix* palms by an insect vector.

If other Texas Phoenix palm decline symptoms are present but the spear leaf has not died, therapeutic treatment of the disease may be achieved by application of the antibiotic oxytetracycline HCl (often referred to as OTC) administered to palms by liquid injection into the trunk. Treatments would continue for the life of the palm on a 4-month treatment schedule.

The most effective use of the antibiotic is as a preventive treatment to protect susceptible palms when Texas Phoenix palm decline is known to occur in the area. Again, treatments should be made every 4 months. Only susceptible palms should receive these treatments.

The only source for the oxytetracycline HCl, an EPA-registered product, is TreeSaver® (<http://www.palmtreesaver.com>). The product is for distribution and use only in Florida. Please read and follow label directions. The web site for the company

provides helpful hints for successful use of this product.

As with lethal yellowing, disease management of Texas Phoenix palm decline via control of the vector (planthopper) population is not recommended, especially since the vector is unknown at this time. Use of host resistance represents the most practical long-term solution. However, the complete palm host range of this phytoplasma is not known.

References

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