

Palm Diseases Caused by Phytoplasmas: Lethal Yellowing and Texas Phoenix Palm Decline

Monica L. Elliott and Nigel A. Harrison
University of Florida, IFAS, Fort Lauderdale Research and Education Center

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Until recently, the only Florida palm disease caused by a phytoplasma was lethal yellowing. In October 2006, a second phytoplasma disease was confirmed in west-central Florida (Sarasota to Tampa). This article describes the new disease and provides an update on the spread of lethal yellowing. Photos referred to in this article are located at:

http://flrec.ifas.ufl.edu/palm_prod/ly-tp.shtml

Lethal Yellowing Update

Lethal yellowing, often referred to as LY, is described in detail in the UF/IFAS Extension document located at <http://edis.ifas.ufl.edu/PP146>, which is being updated to reflect the information below. The disease was first observed in Florida in the 1970s. Currently, there are 36 palm species known to be susceptible to lethal yellowing. *Cocos nucifera* (coconut), *Adonidia merrillii* (Christmas palm), *Phoenix dactylifera* (date palm) and *Pritchardia* spp. are highly susceptible and are not recommended for widespread landscape use in areas where LY is known to occur.

Historically, LY has occurred only in the southern one-third of Florida, presumably because the planthopper vector (*Myndus crudus*), which spreads the phytoplasma, is not cold hardy. The disease had not been observed on the west coast of Florida north of Lee County until this year (2007). In May, the disease was confirmed in Sarasota County where two *Phoenix canariensis* (Canary Island date palm) were affected. Both palms were originally planted in this landscape site about 20 years ago. Spread of the disease may be a consequence of mild winters during the last decade, thus allowing *Myndus crudus* to spread and persist further north in the state.

Texas Phoenix Palm Decline

In late 2006, in the Ruskin/Apollo Beach/Balm area, *Phoenix* palms with LY symptoms were sampled. DNA analysis determined the palms were infected with a phytoplasma related to, but genetically distinct from, the one that causes LY. The signature DNA sequence obtained from this new strain was a perfect match to the signature of a phytoplasma known to cause Texas Phoenix palm decline disease on *P. canariensis* (Canary Island date palm) in the Corpus Christi area of Texas.

The presence of this new phytoplasma strain has been confirmed in symptomatic *P. canariensis*, *P. dactylifera* and *P. sylvestris* in landscape and field nursery sites from Sarasota County to Hillsborough County. It is not known when this phytoplasma arrived on Florida shores, but it was probably before the hurricane seasons of 2004/2005, as it would take considerable time for both the pathogen and vector populations to increase to significant levels. The phytoplasma was probably

moved from Texas to Florida via an infected vector, as very few, if any, mature Canary Island date palms are moved from southeast coastal Texas to Florida.

The vector of this new phytoplasma is unknown, but it is unlikely to be the plant hopper *Myndus crudus*. In the one insect survey conducted by the Texas Department of Agriculture in the Rio Grande Valley where Texas Phoenix decline was active, *Myndus crudus* was rarely found. However, several other candidate planthopper species that could vector the phytoplasma were found in abundance.

Thus far, the known susceptible hosts for Texas Phoenix decline phytoplasma are *Phoenix* species, specifically *P. canariensis*, *P. dactylifera* and *P. sylvestris*, and *Syagrus romanzoffiana* (queen palm). A discussion regarding queen palms occurs later in this article. At one landscape site in Sarasota County, two *P. canariensis* were infected with the lethal yellowing phytoplasma while a third *P. canariensis* was infected with the Texas Phoenix decline phytoplasma. Whether a palm can be co-infected with both phytoplasmas is not known. How far and how quickly Texas Phoenix 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.

The symptoms of this new disease appear to be exactly the same as those associated with lethal yellowing of *Phoenix* species. The first obvious symptom on mature palms is a premature drop of most or all fruits (Figure 1). 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). The onset of leaf discoloration is usually first recognized as a greater number of dead lower leaves than would be normal. This symptom might be confused with other problems such as early senescence due to nutrient deficiency (e.g., potassium) or Ganoderma butt rot. If someone is continually removing these dying or dead leaves (nobody likes an untidy palm!), even this symptom may not be obvious.

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. Usually by the time the apical meristem dies, mature roots of palms at or near the soil surface are unusually 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.

While you would think it would be fairly obvious when the spear leaf dies, it isn't. *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 on Canary Island date 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.

To confirm a field diagnosis of Texas Phoenix decline with a laboratory test, contact Dr. Monica Elliott (melliott@ufl.edu) for **complete** sampling and mailing instructions and current cost. Briefly, like all phytoplasmas, the Texas Phoenix decline phytoplasma cannot be cultured, so laboratory diagnosis relies on molecular techniques. Sampling is accomplished by boring into the trunk – this requires a drill with a long, large diameter drill bit. The current cost is \$75 per sample, same as it is for lethal yellowing. Do not ship samples without first obtaining the **complete** set of instructions. The quality of the sample is critical for an accurate diagnosis.

Management of Texas Phoenix decline will be similar to that for lethal yellowing (see <http://edis.ifas.ufl.edu/PP146>), with chemical control based on application of the antibiotic oxytetracycline HCl (often referred to as OTC). If the spear leaf has died, the palm should be removed as soon as possible for two reasons. First, death of the spear leaf indicates the apical meristem (bud) has died, so no new growth will occur. Second, the diseased palm serves as a source of the phytoplasma that can be transmitted to healthy *Phoenix* palms by an insect vector. If the spear leaf has not died, therapeutic treatment with OTC injections every four months may be recommended. The antibiotic can also be used preventively to protect palms when Texas Phoenix decline is known to occur in the area. There is only source of this EPA-registered product, TreeSaver®. The company's web site is <http://www.palmtreesaver.com/>.

As with lethal yellowing, disease management of Texas Phoenix decline via control of the vector population would not be 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.

Two juvenile queen palms were diagnosed with the Texas Phoenix 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, with the spear leaf being the last leaf to die. Both palms were in a *Phoenix* palm grove where the Texas Phoenix decline disease was occurring in high frequency. Thus, proximity to high levels of pathogen and vector may account for these two diseased palms. 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-Queen-Palms-Mexican-Fan-Palms-July.pdf for information on this disease.