UF IFAS Extension UNIVERSITY of FLORIDA

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Lightning Damage to Landscape Palms[1]

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Florida is considered the lightning capital of the world. Its proximity between the Gulf of Mexico and the Atlantic Ocean generates heated moisture to make it a breeding ground for thunderstorms and lightning. During the summer, sea breeze fronts are a major contributor to afternoon thunderstorms. In fall through spring, northern cold fronts can trigger occasional rounds of thunderstorms. According to AccuWeather, Florida has on average 3,500 cloud-to-ground lightning strikes per day and 1.2 million strikes per year. In south Florida, the lightning season is generally from mid-June through September. Based on the average numbers of thunderstorm days per year, nine of the ten top lightning-prone cities in the United States are in Florida. Fort Myers ranks as the number-one lightning-prone city with 88.0 thunderstorm days per year, followed by Tampa (82.7), Tallahassee (82.5), Orlando (81.8), and West Palm Beach (76.8).

Some palm species are more susceptible to lightning strikes than other species; the reason is unknown. Generally, palms of great heights, those in the open or in small groups, and those in relatively good health are more prone to lightning strikes. Royal palms (*Roystonea regia*), coconut palms (*Cocos nucifera*) and Washington palms (*Washingtonia robusta*) are particularly vulnerable, but other tall palms may be equally susceptible.

Heat and Speed of Lightning

The most important effect of a lightning strike is the extreme heat, speed, and shock waves generated by the bolt. The electrical current of 35,000 amps produces temperatures in excess of 50,000°F in a millionth of a second and pressures of 50 atmospheres. The velocity is about 1/10 the speed of light, making the trip from cloud to ground, or around the plant and back to the cloud, in about 100 millionths of a second. A direct lightning strike on a palm is usually fatal.

Learning to distinguish the symptoms of lightning strikes is a valuable tool for arborists, landscapers, pest control companies, and gardeners. The symptoms may be confused with other causes such as lethal yellowing disease (*Candidatus palmae* Phytoplasma), Thielaviopsis trunk rot (*Thielaviopsis paradoxa*), palmetto weevil (*Rhynchophorus cruentatus*), and even storm damage. Lightning injury symptoms are variable and could include the following:

- Symptom onset occurs within days of a recent thunderstorm.
- A sudden collapse of the crown occurs, usually beginning with the older, lower fronds (Figures 1–4).
- The collapsed fronds are at first green but become brown and necrotic within days or in two to three weeks after the strike (Figure 5).
- The crownshaft of royal palms is sometimes broken and collapsed at its base (Figure 6).
- An upper hollowed trunk sometimes occurs (Figure 7).
- The hollowed trunk may at first be filled with slush from the overheated shattered tissue (Figure 8).

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- The slush is odorless during the first few days of the injury and perhaps weeks thereafter.
- A longitudinal gash may occur on the trunk (Figures 9–10) and perhaps also on the crownshaft.
- Numerous shot holes might appear in the trunk.
- Bleeding, otherwise known as sap flow, may occur from the trunk (Figures 11–12).
- Mature and immature nuts fall from the palm days after a lightning strike (Figure 13).
- The crown eventually falls from the trunk (Figure 14). However, the crown often detaches for other reasons.
- Injury or death to adjacent understory plants is sometimes present (Figure 15).
- Several palms can be killed by a single strike if they are in close proximity. The lightning can disperse from one palm to others nearby. When this occurs, it is possible that palms directly hit will die very quickly, along with nearby vegetation, whereas those palms hit indirectly are more likely to linger for months (Figure 16).
- Loose soil is sometimes found around the base of the palm.

Figure 1. Typical initial symptom of a lightning struck royal palm. Leaves are still green but have collapsed against the trunk; meanwhile, the spear leaf remains upright.
Credits: Douglas Caldwell, UF/IFAS

Figure 2. Sudden collapse of the crown of a coconut palm begins with the lower fronds.
Credits: Stephen H. Brown, UF/IFAS

Figure 3. Collapse of the entire crown of a coconut palm still with green leaves.
Credits: Stephen H. Brown, UF/IFAS

Figure 4. Crown collapse of coconut palm.
Credits: Stephen H. Brown, UF/IFAS

Figure 5. The collapsed fronds become brown. This is the same palm as in Figure 3 but 10 days later.
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Figure 6. Broken and collapsed royal palm crownshaft.
Credits: Stephen H. Brown, UF/IFAS

Figure 7. The upper trunk may be hollowed, as with this royal palm.
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Figure 8. The upper hollowed trunk may be filled with odorless slush.
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Figure 9. Vertical gash on the trunk of a royal palm.
Credits: Stephen H. Brown, UF/IFAS

Figure 10. The pseudobark on this Washingtonian palm has a long vertical gash along its trunk.
Credits: Stephen H. Brown, UF/IFAS

Figure 11. Bleeding from the trunks of two coconut palms.
Credits: Stephen H. Brown, UF/IFAS

Figure 12. Bleeding from the trunk of a queen (*Syagrus romanzoffiana*) palm.
Credits: Stephen H. Brown, UF/IFAS

Figure 13. Nuts from a coconut palm fall within days after being struck by lightning.
Credits: Stephen H. Brown, UF/IFAS

Figure 14. The eventual falling away of the crown leaves a standing trunk.
Credits: Stephen H. Brown, UF/IFAS

Figure 15. Understory plants damaged by the discharge.
Credits: Stephen H. Brown, UF/IFAS

Figure 16. Several palms can be killed by a single strike. The one directly struck is usually the first to die. Notice the dead understory plants under the coconut palms most affected.
Credits: Stephen H. Brown, UF/IFAS

Lightning Protection Systems

Most homeowners will probably not be able to afford the cost and maintenance of a lightning protection system. However, in public or common spaces and with palms of high landscape value or visibility, a lightning protection system may be warranted. Lightning protection systems do not dissipate the electrical charge when struck. Instead they are intended to provide a preferred, nondamaging path to the ground for a lightning strike.

The system should be installed by an experienced certified arborist and may last for up to 50 years if properly maintained. As the palm grows, its canopy will begin to obscure the conductor, making the system less effective. To avoid this, periodic adjustments of the rod to keep it above the canopy of growing palms may be necessary (Figures 17–18). The palm should be inspected annually on younger, fast-growing palms and every two to three years on older, slower-growing palms. It is the responsibility of the palm's owner to schedule the inspections.

Although some palms may survive six months or longer following a strike, lightning strikes are usually fatal to palms, and injuries cannot be treated. Palms with leaves that are collapsed against the trunk (Figures 1 and 3) or with broken crownshafts (Figure 6) can be removed even when leaves are green.

Figure 17. Lightning protection installed on a yellow latania palm.
Credits: A. D. Ali, The Davey Tree Expert Co.

Figure 18. Close-up of the down cable that carries the current to the ground.
Credits: A. D. Ali, The Davey Tree Expert Co.

"Snags"

Dead palms can be a scarce resource for wildlife habitat in many urban areas. A dead palm can remain standing for years without any fronds. If it is not a danger to pedestrians or structures, it could conceivably serve as a "snag" to attract wildlife (Figure 19). It is an ideal nest site for woodpeckers and other cavity-nesting birds that cannot excavate their own nesting cavities. However, dead palms also serve as a magnet for Ganoderma butt rot (*Ganoderma zonatum*) to become established in the landscape, and that is a good reason to remove the dead palm trunks and stumps. The stump should be ground up to prevent it from becoming a food source for the fungus that causes Ganoderma butt rot.

Figure 19. A palm serves as a wildlife "snag."
Credits: Stephen H. Brown, UF/IFAS

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