

Preparing for and recovering



from a hurricane

By Mongi Zekri, Bob Rouse and Jonathan Crane

Hurricane preparation for citrus growers this year is the same drill as every year. Each year, growers look forward to the rainy season to help their young trees grow fast and their mature trees produce good crops. This year, growers will be praying for good distribution of rains following a year of heavy rain in some months. Along with the anticipation of the rainy season is the reality that tropical storms or hurricanes may bring too much rain and wind, causing devastation to citrus groves.

2017 FORECAST

Every year, there are predictions of what the hurricane season (June 1 through November 30) will bring. Sometimes it may seem like hocus-pocus when the prognostications are made. Each year, highly popular and widely publicized forecasts for the Atlantic Basin come from Colorado State University (CSU) and the National Oceanic and Atmospheric Administration.

The 2017 Atlantic hurricane season forecast released in April 2017 by CSU officials calls for the number of named storms and hurricanes to be slightly below historical averages. CSU predicts 11 named storms during the upcoming season (Table 1). CSU expects four of the 11 named storms to become hurricanes, with two likely to reach major hurricane status. The prognostication for a slightly below-average season was based on the potential that a weak-to-moderate El Niño could develop by the peak of the Atlantic hurricane season. CSU states that El Niño tends to increase upper-level westerly winds across the Caribbean into the tropical Atlantic, tearing apart hurricanes as they try to form.

Table 1. 2017 Colorado State University hurricane forecast compared with the 30-year average

| 2017 Hurricane Season Forecast | | |
|--------------------------------|-----------------|--------------------------------|
| | 30-year average | 2017 Colorado State University |
| Named Storms | 12 | 11 |
| Hurricanes | 6 | 4 |
| Category 3 or Higher | 2 | 2 |

SCOPE OF POTENTIAL DAMAGE

The Saffir-Simpson hurricane scale is a 1 to 5 rating based on the wind intensity of the hurricane and is useful in estimating the potential damage expected from a hurricane landfall (Table 2).

Winds from hurricanes may cause almost complete defoliation of citrus trees, moderate-to-severe limb damage, severe trunk twisting and breakage, tree toppling, uprooting of entire trees and the loss of almost all fruit (Figure 1), depending on the intensity of the hurricane and the proximity of the eye of the storm. Flooding during and after hurricanes may lead to root rot caused by low soil oxygen conditions and/or fungal diseases. Grove infrastructure such as irrigation systems, farm equipment, roads and farm storage buildings may also be heavily damaged by hurricanes and tropical storms.

Table 2. Saffir-Simpson hurricane storm rating scale

| Storm Category | Wind Speed (mph) | Expected Damage to Citrus Trees and Fruit |
|----------------|------------------|---|
| 1 | 74–95 | Some loss of leaves and fruit, heaviest in exposed areas |
| 2 | 96–110 | Considerable loss of leaves and fruit with some trees blown over |
| 3 | 111–130 | Heavy loss of foliage and fruit, many trees blown over |
| 4 | 131–155 | Trees stripped of all foliage and fruit, many trees blown over and away from property |
| 5 | over 155 | Damage would be almost indescribable, groves completely destroyed |



Figure 1. Limb damage, trunk twisting and breakage, tree toppling and loss of leaves and fruit can result from hurricanes.

2016 SEASON SUMMARY

The 2016 Atlantic hurricane season (Table 3) featured a combination of destructive hurricanes and climatological oddities. Fifteen named storms and seven hurricanes formed in the Atlantic Basin in 2016, the most since the 2012 season.

Table 3. 2016 Atlantic hurricane season statistics

| | 2016 | 1981–2010 Average |
|--|------|-------------------|
| Named Storms | 15 | 10.8 |
| Hurricanes | 7 | 5.6 |
| Hurricanes (Category 3 or stronger) | 3 | 2.5 |

Utilizing the Accumulated Cyclone Energy (ACE) index, which adds up the longevity and intensity of each named storm, 2016 was the most active season in the Atlantic Basin since 2010. ACE is often used to compare seasons to show how active or inactive a season was, in effect, giving a measure of the quality, rather than the quantity, of tropical cyclones in a given year.

Hurricane Matthew was the most powerful storm to threaten the southeast coast in more than a decade. When Matthew reached the eastern Caribbean, it rapidly intensified and became a hurricane. It reached Category 5 strength with 160 mph winds. Hurricane Matthew made landfall in Haiti on October 4 as a Category 4. It was the worst humanitarian disaster in that country since the 2010 earthquake. The United Nations estimated Matthew affected over 2 million people with a death toll at over 1,000.

Hurricane Matthew then moved very close to the coasts of Florida, Georgia, South Carolina and North Carolina. More than 15 inches of rain fell in some places along the Eastern Seaboard of the impacted states. Additionally, storm surge along the coast from Florida to North Carolina flooded coastal cities, narrowed beaches through erosion and backed up rivers.

Luckily, Hurricane Matthew spared Florida's citrus industry, causing only minor damage to the Indian River citrus region and vegetables in the southern part of the state. The center of the storm, which packed winds up to 130 miles per hour, remained off the coast and instead left the area with lesser tropical force winds to the inland areas, where the region's grapefruit is grown.

Tropical storm and hurricane predictions are dubious and a curiosity, and shouldn't affect what we must do. We must prepare every year, regardless of weather predictions. Little can be done to protect trees and fruit from hurricane-velocity wind, but we can take steps to protect the people, equipment and supplies that will be needed for a quick recovery. Below is a checklist for citrus grove managers. *(Continued on page 14)*



(Continued from page 12)

PRE-HURRICANE PREPARATION CHECKLIST

❑ Personnel Assignments

1. Make a list of all potential recovery tasks and make assignments to effectively begin recovery if needed.
2. Develop damage-inspection teams.
3. Update the worker contact list and establish a procedure for them to call in after the storm.

❑ Safety Training

Train workers in the safe operation of unfamiliar equipment they may have to use in the recovery effort. For example, drivers may have to use chain saws to remove downed trees blocking roads.

❑ Insurance

Have insurance documents of buildings and equipment, including tractors, irrigation parts and supplies in a safe place.

❑ Buildings

1. Close storm shutters or board up windows.
2. Store loose, lightweight objects such as garbage cans and tools in an area that minimizes them from being blown around and causing additional damage.

❑ Liquid Tanks

1. Keep fuel, fertilizer and other tanks full so they don't move in the wind.
2. Ensure sufficient fuel is available to operate equipment.

❑ Roads and Ditches

1. Clear, grade and keep roads well-maintained.
2. Keep ditches clean and pumped down.
3. Arrange with a flying service for the grove manager to survey grove damage.

❑ Emergency Equipment

1. Test-run generators, chain saws, torches, air compressors and other hurricane recovery equipment.
2. Have shovels, fuel, paint and equipment parts available and in good repair.
3. Know where to obtain backhoes, front-end loaders and other heavy equipment that could be rented or leased.

❑ Communications Equipment

1. Ensure that communication equipment is in good working order.
2. Have handheld, portable radios or other communication equipment with extra charged battery packs available.
3. Direct truck-to-truck radio and cellular phones save valuable time during recovery.

❑ Hazardous Materials

1. Secure hazardous materials prior to a storm.
2. Shut down gasoline pumps.

❑ Emergency Contacts

Have a list of emergency phone numbers, including electric companies, sheriff and medical facilities available in the event an emergency situation develops.

❑ Cultural Practices

1. Regular pruning can reduce broken limbs and minimize toppled or uprooted trees.
2. Windbreaks reduce tree damage and spread of citrus canker bacterium.

Have handheld, portable radios or other communication equipment with extra charged battery packs available.

(Continued on page 16)

(Continued from page 14)

POST-HURRICANE RECOVERY CHECKLIST

☐ Damage Inspection

1. Make a visual assessment of the damage and determine priorities and equipment needed.
2. Take lots of photos as they may be useful in verifying damage when insurance claims are submitted.

☐ Prioritize Damage

A priority plan can quickly determine where and how to begin recovery operations.

☐ Employee Call-in

When safe, call in those needed for damage inspection and grove recovery work.

☐ Clear Road Access

Clear roads to where trees must be reset or recovery activities must be conducted.

☐ Water Removal

Remove excess water from tree root zones within 72 hours to avoid root damage.

☐ Tree Rehabilitation (Figure 2)

1. Resetting trees to an upright position should be accomplished as soon as possible.
2. Toppled trees should be pruned back to sound wood.
3. Painting exposed trunks and branches with white latex paint helps prevent sunburn.

☐ Irrigation

Check operation of the irrigation system as rehabilitation is a long process and maintaining tree water supply is critical.

☐ Fertilizer

1. Plant nutrients should be applied when new growth begins.
2. Toppled trees will require less fertilizer due to a reduced root system and tree canopy.
3. Reduce nitrogen fertilizer proportionally to canopy and/or to leaf loss.
4. The following year, trees may require more-than-normal rates to re-establish canopy.
5. Micronutrients should be applied in nutritional sprays to the leaves and soil-applied as well.

☐ Weeds

Resume row middle mowing and herbicide applications on a normal schedule.

CONCLUSION

Planning for a hurricane will help reduce damage to citrus trees and enhance recovery of the grove operation. One of the most important pre-hurricane practices is the maintenance of a regular pruning program to limit tree size.

After a hurricane, being prepared for clearing debris, repairing irrigation systems, resetting toppled trees, protecting trees from sunburn when a significant portion of the canopy has been removed, and irrigating and fertilizing trees frequently will increase chances of tree recovery. 🍊

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Figure 2. Pruning and resetting a tree to an upright position