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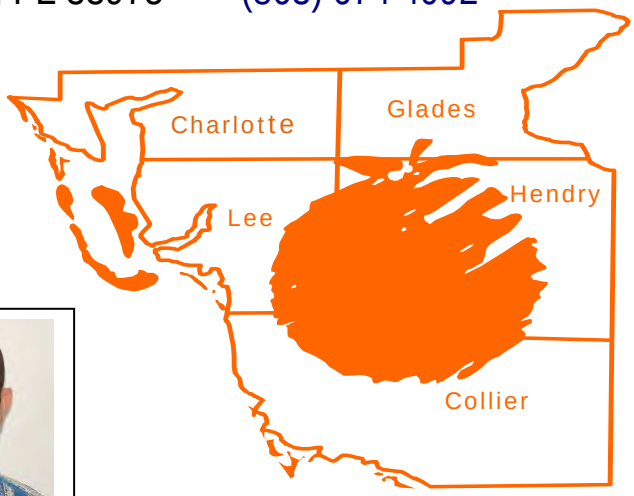
# Flatwoods Citrus




**Vol. 26, No. 6** **June 2023**

Dr. Mongi Zekri
Multi-County Citrus Agent, SW Florida

Mongi Zekri

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United States Department of Agriculture
National Agricultural Statistics Service

# CITRUS JUNE FORECAST

Cooperating with the Florida Department of Agriculture and Consumer Services
851 Trafalgar Ct, Suite 310E, Maitland, FL 32751-4132
(407) 648-6013 · (855) 271-9801 FAX · www.nass.usda.gov/fl

June 9, 2023

**Florida All Orange Production up 1 Percent**
**Florida Non-Valencia Orange Production Unchanged**
**Florida Valencia Orange Production up 1 Percent**
**Florida All Grapefruit Production Up 1 Percent**
**Florida All Tangerine and Tangelo down 2 Percent**

FORECAST DATES - 2022-2023 SEASON
July 12, 2023

## Citrus Production by Type – States and United States

| Crop and State | Production [1] | | 2022-2023 Forecasted Production [1] | |
|---|---|---|---|---|
| | 2020-2021 | 2021-2022 | May | June |
| | (1,000 boxes) | (1,000 boxes) | (1,000 boxes) | (1,000 boxes) |
| **Non-Valencia Oranges [2]** | | | | |
| **Florida** | **22,700** | **18,250** | **6,150** | **6,150** |
| California [3] | 41,300 | 31,500 | 37,000 | 37,000 |
| Texas [3] | 1,000 | 170 | 700 | 700 |
| United States | 65,000 | 49,920 | 43,850 | 43,850 |
| **Valencia Oranges** | | | | |
| **Florida** | **30,250** | **22,950** | **9,500** | **9,600** |
| California [3] | 7,700 | 7,600 | 8,100 | 8,100 |
| Texas [3] | 50 | 30 | 350 | 350 |
| United States | 38,000 | 30,580 | 17,950 | 18,050 |
| **All Oranges** | | | | |
| **Florida** | **52,950** | **41,200** | **15,650** | **15,750** |
| California [3] | 49,000 | 39,100 | 45,100 | 45,100 |
| Texas [3] | 1,050 | 200 | 1,050 | 1,050 |
| United States | 103,000 | 80,500 | 61,800 | 61,900 |
| **Grapefruit** | | | | |
| **Florida-All** | **4,100** | **3,330** | **1,800** | **1,820** |
| **Red** | **3,480** | **2,830** | **1,560** | **1,570** |
| **White** | **620** | **500** | **240** | **250** |
| California [3 4] | 4,200 | 4,100 | 4,200 | 4,200 |
| Texas [3] | 2,400 | 1,700 | 2,400 | 2,400 |
| United States | 10,700 | 9,130 | 8,400 | 8,420 |
| **Lemons [3]** | | | | |
| Arizona | 750 | 1,250 | 1,700 | 1,700 |
| California | 20,100 | 25,200 | 23,000 | 23,000 |
| United States | 20,850 | 26,450 | 24,700 | 24,700 |
| **Tangerines and Tangelos** | | | | |
| **Florida** | **890** | **750** | **500** | **490** |
| California [3] | 28,800 | 17,500 | 21,000 | 21,000 |
| United States | 29,690 | 18,250 | 21,500 | 21,490 |

[1] Net pounds per box: oranges in California-80, Florida-90, Texas-85; grapefruit in California and Texas-80, Florida-85; lemons-80; and tangerines and mandarins in California-80, Florida-95.
[2] Early non-Valencia (including Navel) and mid-season non-Valencia varieties in Florida; Navel and miscellaneous varieties in California; Early and mid-season varieties in Texas.
[3] Estimates carried forward from previous forecast.
[4] Includes pummelos in California.

## All Oranges 15.8 Million Boxes

The 2022-2023 Florida all orange forecast released today by the USDA Agricultural Statistics Board is 15.8 million boxes. The total includes 6.15 million boxes of non-Valencia oranges (early, mid-season, and Navel varieties) and 9.60 million boxes of Valencia oranges.

## Non-Valencia Oranges 6.15 Million Boxes

The forecast of non-Valencia orange production is 6.15 million boxes. The Navel forecast, included in the non-Valencia portion of the forecast is 240,000 boxes, 4 percent of the non-Valencia total. Harvest is over for the season.

## Valencia Oranges 9.60 Million Boxes

The forecast of Valencia orange production is 9.60 million boxes. The Row Count survey conducted May 31, 2023, showed Valencia harvest is virtually complete.

## All Grapefruit 1.82 Million Boxes

The forecast of all grapefruit production is 1.82 million boxes. The white grapefruit forecast is increased 10,000 boxes to 250,000 boxes. The red grapefruit forecast is increased 10,000 boxes to 1.57 million boxes. The Row Count survey conducted May 31, 2023, indicated that harvest is virtually complete for these varieties.

## Tangerines and Tangelos 490,000 Boxes

The forecast for tangerines and tangelos is 490,000 boxes down 10,000 boxes from the previous forecast. This production level is 35 percent less than last season's final production of 750,000 boxes. This forecast number includes all certified tangerine and tangelo varieties.

## Reliability

To assist users in evaluating the reliability of the June 1 Florida production forecasts, the "Root Mean Square Error," a statistical measure based on past performance, is computed. The deviation between the June 1 production forecast and the final estimate is expressed as a percentage of the final estimate. The average of squared percentage deviations for the latest 20-year period is computed. The square root of the average becomes statistically the "Root Mean Square Error." Probability statements can be made concerning expected differences in the current forecast relative to the final end-of-season estimate, assuming that factors affecting this year's forecast are not different from those influencing recent years.

The "Root Mean Square Error" for the June 1 Florida all orange production forecast is 1.1 percent. If you exclude the three abnormal production seasons (three hurricane seasons), the "Root Mean Square Error" is 0.8 percent. This means chances are 2 out of 3 that the current all orange production forecast will not be above or below the final estimates by more than 1.1 percent, including abnormal seasons, or 0.8 percent, excluding abnormal seasons. Chances are 9 out of 10 (90 percent confidence level) that the difference will not exceed 2.0 percent including abnormal season and or 1.4 percent excluding abnormal seasons.

Changes between the June 1 Florida all orange forecast and the final estimates during the past 20 years have averaged 1.13 million boxes (0.93 million boxes, excluding abnormal seasons), ranging from 0.10 million boxes to 5.30 million boxes including abnormal seasons, (0.10 to 3.00 million boxes excluding abnormal seasons). The June 1 forecast for all oranges has been below the final estimate 14 times, above 6 times, (below 13 times, above 4 times, excluding abnormal seasons). The difference does not imply that the June 1 forecasts this year are likely to understate or overstate final production.

**Via Zoom Citrus Workshop**

**July 2023 Citrus Workshop**
Date and time: Wednesday, July 19, 2023, 10:00 AM – 11:00 AM
**Topic:** Irrigation and nutrition of HLB-infected trees
Speaker: **Dr. Davie M. Kadyampakeni**, Assistant Professor in Soil and Water Sciences at the UF-IFAS Citrus Research & Education Center in Lake Alfred

The Zoom link will be available next month.

**Coordinator: Dr. Mongi Zekri, UF-IFAS, maz@ufl.edu**
1 CEU for pesticide license renewal
1 CEU for certified crop advisors

# CEUs for pesticide license renewal

**Earn CORE CEUs online through Southeast AgNet & Citrus Industry magazine**
http://citrusindustry.net/ceu/

The following series of articles and quizzes are available with their expiration dates noted:

- 2023 #2 **What To Do When You've Been Exposed to a Pesticide (4/30/24)**
- 2023 #1: **Key Terms to Know When Using Pesticides (1/31/24)**
- 2022 #4: **Making Sense of Pesticide Formulations (10/31/23)**
- 2022 #3: **Agricultural Pesticide Licensing: Frequently Asked Questions (7/31/23)**

***Each article grants one General Standards (Core) CEU when submitted and approved toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license.***

https://crec.ifas.ufl.edu/resources/production-guide/

The objective of the Florida Citrus Production Guide is to assist citrus growers in the identification of pest management options and the selection of appropriate control measures. This publication should serve as a reference once it has been determined that control measures might be warranted. It is not intended to replace pesticidal product labels which contain important usage information and should be immediately accessible for reference. Violations of directions for use printed on the label are against State and Federal laws. Care should be taken to select only those treatments best suited for control of the specific pest(s) identified as requiring suppression. Products listed in all tables have been shown to be efficacious, non-phytotoxic to citrus, and relatively safe on non-target arthropods and microorganisms when used as directed. However, it is important to realize that results may not be consistent under different environmental, application, and tank mix conditions.

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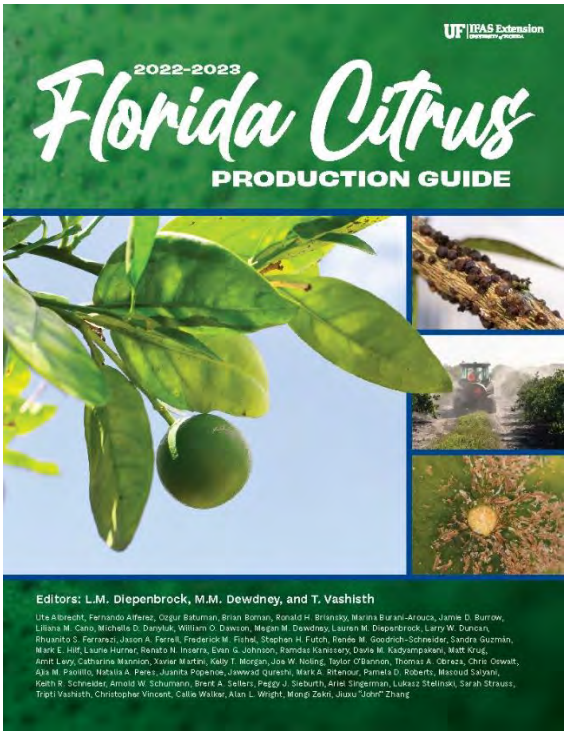
## PRODUCTION GUIDE MENU



If you did not pick up your hard copy of the newly updated Florida Citrus Production Guide at the Citrus Expo, you can find the electronic version online https://crec.ifas.ufl.edu/resources/production-guide/

If you need hard copies, you can get them free from your Citrus Extension Agent or from the Citrus Research & Education Center in Lake Alfred and the Southwest Florida Research and Education Center in Immokalee.



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# EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

**issued by**

## CLIMATE PREDICTION CENTER/NCEP/NWS
## and the International Research Institute for Climate and Society

8 June 2023

ENSO Alert System Status: El Niño Advisory

Synopsis: El Niño conditions are present and are expected to gradually strengthen into the Northern Hemisphere winter 2023-24.

In May, weak El Niño conditions emerged as above-average sea surface temperatures (SSTs) strengthened across the equatorial Pacific Ocean [Fig. 1]. All of the latest weekly Niño indices were more than +0.5°C: Niño-3.4 was +0.8°C, Niño-3 was +1.1°C, and Niño1+2 was +2.3°C [Fig. 2]. Area-averaged subsurface temperatures anomalies remained positive [Fig. 3], reflecting the continuation of widespread anomalous warmth below the surface of the equatorial Pacific Ocean [Fig. 4]. For the May average, low-level wind anomalies were westerly over the western equatorial Pacific Ocean, while upper-level wind anomalies were westerly over the eastern Pacific Ocean. Convection was enhanced along the equator and was suppressed over Indonesia [Fig. 5]. Both the equatorial SOI and traditional SOI were significantly negative. Collectively, the coupled ocean-atmosphere system reflected the emergence of El Niño conditions.

The most recent IRI plume indicates the continuation of El Niño through the Northern Hemisphere winter 2023-24 [Fig. 6]. Confidence in the occurrence of El Niño increases into the fall, reflecting the expectation that seasonally averaged Niño-3.4 index values will continue to increase. Another downwelling Kelvin wave is emerging in the western Pacific Ocean, and westerly wind anomalies are forecasted to recur over the western Pacific. At its peak, the chance of a strong El Niño is nearly the same as it was last month (56% chance of November-January Niño-3.4 ≥ 1.5°C), with an 84% chance of exceeding moderate strength (Niño-3.4 ≥ 1.0°C). In summary, El Niño conditions are present and are expected to gradually strengthen into the Northern Hemisphere winter 2023-24 [Fig. 7].

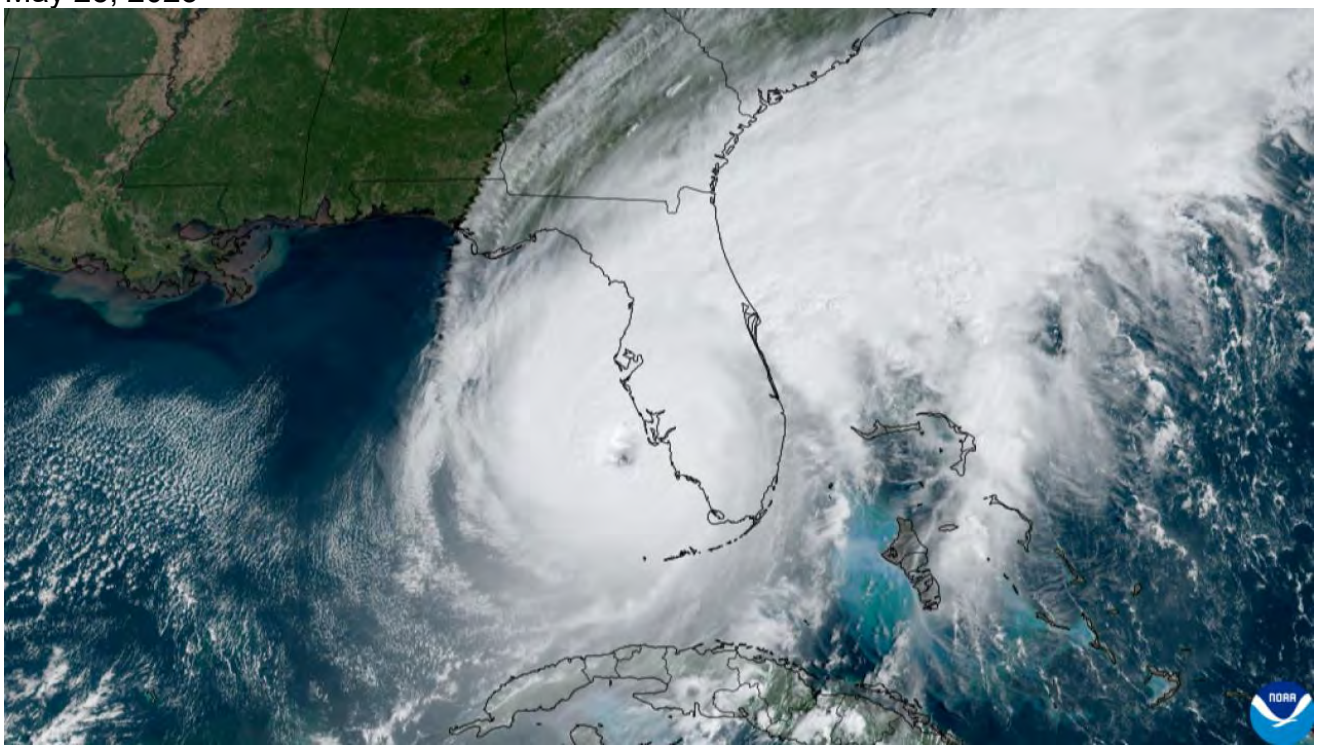
This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Additional perspectives and analysis are also available in an ENSO blog. A probabilistic strength forecast is available here. The next ENSO Diagnostics Discussion is scheduled for 13 July 2023.

**Climate Prediction Center**
**National Centers for Environmental Prediction**
**NOAA/National Weather Service**

# NOAA predicts a near-normal 2023 Atlantic hurricane season

## El Nino, above-average Atlantic Ocean temperatures set the stage

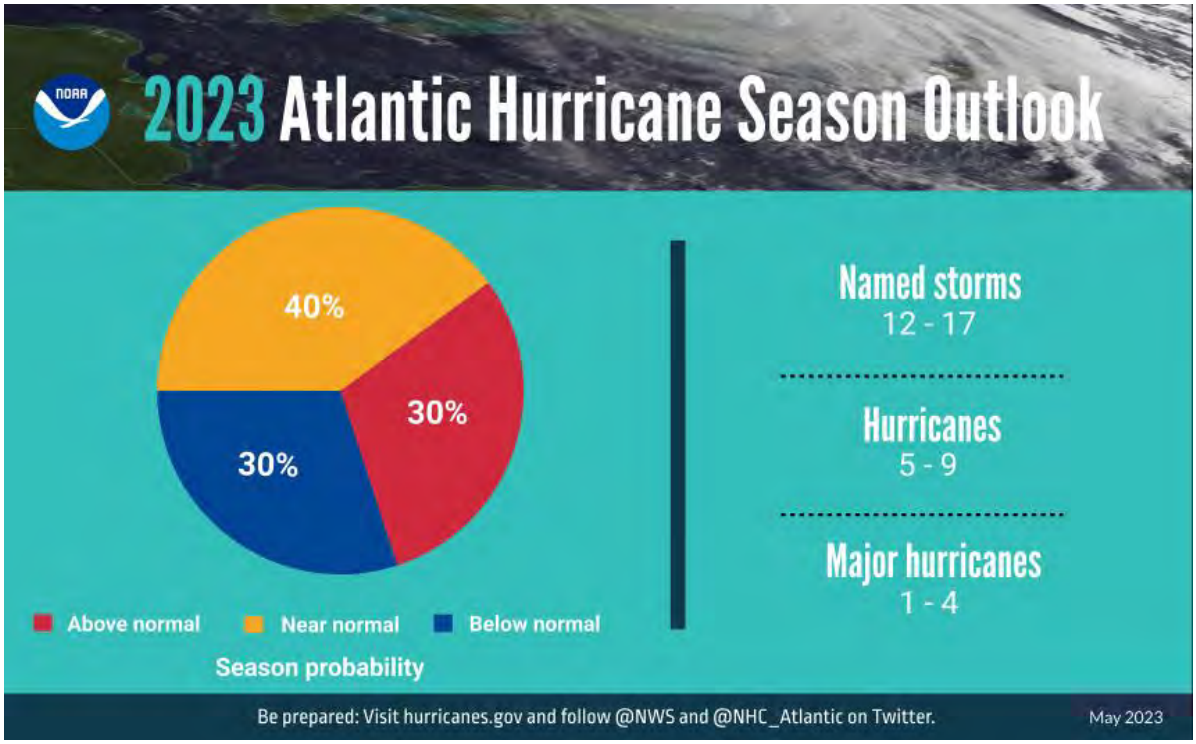
May 25, 2023



NOAA GOES satellite captures Hurricane Ian as it made landfall on the barrier island of Cayo Costa in southwest Florida on September 28, 2022.

NOAA forecasters with the Climate Prediction Center, a division of the National Weather Service, predict near-normal hurricane activity in the Atlantic this year. NOAA's outlook for the 2023 Atlantic hurricane season, which goes from June 1 to November 30, predicts a 40% chance of a near-normal season, a 30% chance of an above-normal season and a 30% chance of a below-normal season.

NOAA is forecasting a range of 12 to 17 total named storms (winds of 39 mph or higher). Of those, 5 to 9 could become hurricanes (winds of 74 mph or higher), including 1 to 4 major hurricanes (category 3, 4 or 5; with winds of 111 mph or higher). NOAA has a 70% confidence in these ranges.




A summary infographic showing hurricane season probability and numbers of named storms predicted from NOAA's 2023 Atlantic Hurricane Season Outlook. (Image credit: NOAA)

“Thanks to the Commerce Department and NOAA’s critical investments this year in scientific and technological advancements in hurricane modeling, NOAA will be able to deliver even more accurate forecasts, helping ensure communities have the information they need to prepare for and respond to the destructive economic and ecological impacts of Atlantic hurricanes,” said Secretary of Commerce Gina M. Raimondo.

A summary graphic showing an alphabetical list of the 2023 Atlantic tropical cyclone names as selected by the World Meteorological Organization. The official start of the Atlantic hurricane season is June 1 and runs through November 30. (Image credit: NOAA)

The upcoming Atlantic hurricane season is expected to be less active than recent years, due to competing factors — some that suppress storm development and some that fuel it — driving this year's overall forecast for a near-normal season.

After three hurricane seasons with La Nina present, NOAA scientists predict a high potential for El Nino to develop this summer, which can suppress Atlantic hurricane activity. El Nino's potential influence on storm development could be offset by favorable conditions local to the tropical Atlantic Basin. Those conditions include the potential for an above-normal west African monsoon, which produces African easterly waves and seeds some of the stronger and longer-lived Atlantic storms, and warmer-than-normal sea surface temperatures in the tropical Atlantic Ocean and Caribbean Sea which creates more energy to fuel storm development. These factors are part of the longer term variability in Atlantic atmospheric and oceanic conditions that are conducive to hurricane development — known as the high-activity era for Atlantic hurricanes — which have been producing more active Atlantic hurricane seasons since 1995.

"With a changing climate, the data and expertise NOAA provides to emergency managers and partners to support decision-making before, during and after a hurricane has never been more crucial," said NOAA Administrator Rick Spinrad, Ph.D. "To that end, this year we are operationalizing a new hurricane forecast model and extending the tropical cyclone outlook graphic from five to seven days, which will provide emergency managers and communities with more time to prepare for storms."

This summer, NOAA will implement a series of upgrades and improvements. NOAA will expand the capacity of its operational supercomputing system by 20%. This increase in computing capability will enable NOAA to improve and run more complex forecast models, including significant model upgrades this hurricane season:

- In late June, the Hurricane Analysis and Forecast System (HAFS) will become operational. HAFS will run this season in tandem with the currently operational Hurricane Weather Research and Forecast Model System and Hurricanes in a Multi-scale Ocean-coupled Non-hydrostatic model, but eventually will become NOAA's primary hurricane model. Retrospective analysis of tropical storms and hurricanes from the 2020-2022 seasons show that this model has a 10-15% improvement in track forecasts over existing operational models. This new model was jointly created by NOAA's Atlantic Oceanographic & Meteorological Laboratory Hurricane Modeling and Prediction Program and NOAA's National Weather Service Environmental Modeling Center.
- The Probabilistic Storm Surge model upgrade on May 2, advances storm surge forecasting for the contiguous U.S. and new forecasts for surge, tide and waves for Puerto Rico and the U.S. Virgin Islands. Forecasters now have the ability to run the model for two storms simultaneously. This model provides forecasters with the likelihood, or probability, of various flooding scenarios including a near worst-case scenario to help communities prepare for all potential outcomes.

Additional upgrades or new tools for hurricane analysis and forecasting include:

- The National Hurricane Center's Tropical Weather Outlook graphic, which shows tropical cyclone formation potential, has expanded the forecast range from five to seven days.
- Over the last 10 years, flooding from tropical storm rainfall was the single deadliest hazard. To give communities more time to prepare, the Weather Prediction Center is extending the Excessive Rainfall Outlook an additional two days, now providing forecasts up to five days in advance. The outlook shows general areas at risk for flash flooding due to excessive rainfall.
- The National Weather Service will unveil a new generation of forecast flood inundation mapping for portions of Texas and portions of the Mid-Atlantic and Northeast in September 2023. These forecast maps will extend to the rest of the U.S. by 2026. Forecast flood inundation maps will show the extent of flooding at the street level.

NOAA will continue improving new and current observing systems critical in understanding and forecasting hurricanes. Two projects underway this season include:

- New small aircraft drone systems, the deployment of additional Saildrones and underwater gliders, and WindBorne global sounding balloons. These new technologies will advance our knowledge of hurricanes, fill critical data gaps and improve hurricane forecast accuracy.
- The modernization and upgrade of the Tropical Atmosphere Ocean buoy array. The upgrade will provide additional capabilities, updated instruments, more strategic placement of buoys and higher-frequency observations. Data from these buoys are used to forecast El Nino and La Nina, which can influence hurricane activity.

"As we saw with Hurricane Ian, it only takes one hurricane to cause widespread devastation and upend lives. So regardless of the number of storms predicted this season, it is critical that everyone understand their risk and heed the warnings of state and local officials. Whether you live on the coast or further inland, hurricanes can cause serious impacts to everybody in their path," said FEMA Administrator Deanne Criswell. "Visit ready.gov or listo.gov for readiness resources, and get real time emergency alerts by downloading the FEMA App. Actions taken today can save your life when disaster strikes. The time to prepare is now."

NOAA's outlook is for overall seasonal activity and is not a landfall forecast. In addition to the Atlantic seasonal outlook, NOAA also issues seasonal hurricane outlooks for the eastern Pacific and central Pacific hurricane basins. NOAA's Climate Prediction Center will update the 2023 Atlantic seasonal outlook in early August, just prior to the historical peak of the season.

# HURRICANE PREPAREDNESS FOR CITRUS GROVES

Mongi Zekri, Robert E. Rouse, and Jonathan H. Crane

## INTRODUCTION

Each year, growers look forward to the rainy season because it helps their young trees grow fast and their mature trees produce good crops. Growers hope for good distribution of rains following the usual dry spring season. However, along with the anticipation of the rainy season, there is also the reality that tropical storms or hurricanes may bring too much rain and wind, causing devastations to citrus groves (Figure 1). The hurricane season is June 1 through November 30. Any hurricane or severe tropical storm poses a threat to all of Florida with additional issues for south Florida shallow-rooted citrus trees. Strong winds blow fruit off trees. Tree damage resulting from wind and 10–20 inches of rain could be the most severe and lasting injury. In addition to rain, high tides caused by wind blowing toward land may cause saltwater flooding several miles inland. Grove flooding may also be caused by the damaging effect of high tides, which raise the level of water in bays, estuaries, and rivers and prevent excess water from running off groves. While a hurricane has the potential to inflict heavy damage on any grove, growers who have developed hurricane plans prior to the event have the best chance of minimizing losses. They will be the ones most likely to save groves by quickly replanting uprooted and blown-over trees and by removing excess water within 72 hours to avoid root damage caused by suffocation from lack of oxygen.

# PLAN AND PREPARE

It is best to devise a hurricane plan and use it to make preparations far before June, the start of the hurricane season. Although hurricanes can strike at any time during the June–November period, they are most likely to occur in August and September, at the end of the rainy season when the soil and water retention areas are least able to accommodate more water. The hurricane plan should provide for both protection from a storm and recovery after the storm. Little can be done to protect trees and fruit from wind; but growers can take steps to protect the people, equipment, and supplies that will be needed in the recovery process to include adequate insurance for groves, buildings, and equipment. Additional information can be obtained from local county offices of Emergency Management, Sheriff, Chamber of Commerce, and Economic Development. Following are some things to consider in a pre-storm preparation plan and a post-storm recovery plan.

# PRE-STORM PREPARATION

**Personnel assignments**—A major part of the hurricane plan is ensuring that all managers know their responsibilities prior to, during, and after a hurricane. Make a list of all tasks that will need to be performed so there are no last-minute, unanticipated gaps to plug. Identify and maintain an updated list of the members of a damage inspection team, which will determine where storm damage occurred and how extensive it is. Make sure each team member knows his or her responsibilities. Specific workers should be assigned to fix ditches, prop up trees, fix roadways, and perform other tasks after the storm. Make sure you know how to contact workers at their place of safety, and that they have a way to call in after the storm.

**Safety training**—Workers should be trained in the safe operation of unfamiliar equipment that they may have to use if a hurricane hits. For instance, drivers may wind up using chain saws to remove a downed tree that is blocking a road.

**Liquid tanks**—Tanks containing fuel, fertilizer, and other materials should be kept full so they do not move in the wind and rain, and to ensure that sufficient fuel is available for machinery used in recovery efforts after the storm.

**Ditches**—Ditches should be kept clean and pumped down to help maximize water removal efforts after the storm.

**Cultural Practices**—Trees should be pruned regularly to reduce broken limbs and minimize toppled or uprooted trees. Windbreaks can also reduce tree damage and the spread of citrus canker bacterium.

**Emergency equipment**—Make sure that all emergency equipment—including generators, chain saws, torches, and air compressors— is on hand and in good repair. Emergency generators should be available for use in headquarters and equipment maintenance shops. Large diesel powered generators with 25 to 60 kilowatt capacity can be rented or leased by the month during the hurricane season.

**Communications equipment**—Ensure that radios are in good working order. Have hand-held portable radios with extra charged battery packs available for workers who will need them in the field after the storm. Direct truck-to-truck radio communication is most reliable when phone lines are down, but cellular phones with radio capabilities and standard cellular phones can help workers save valuable time during the recovery process, as opposed to communication systems that require messages to be relayed through a base unit.

**Hazardous materials**—Hazardous materials should be secured prior to a storm, and gasoline pumps should be shut down.

**Emergency contacts**—Have a list of phone numbers you might need in an emergency, including numbers for the phone and electric companies, sheriff, and medical facilities.

# POST-STORM RECOVERY

**Activity check list—**An activity check list will help ensure that all essential damage assessment and recovery operations are carried out. Additionally, a plan that prioritizes the importance of individual blocks makes grove recovery efficient. With a priority plan, managers can quickly determine where to begin recovery operations.

**Employee call-in**—Maintain a current list of employee locations and phone numbers. As soon as it is safe to do so, call in those who will be needed for damage inspection and grove recovery work.

**Damage inspection**—If roads are passable, inspection of tree and equipment damage may be conducted from trucks. Since flooding, downed trees, and electrical poles may have blocked roads, large growers should consider making prior arrangements for a helicopter or flying service to transport the grove manager to survey grove damage. Aerial surveillance can also determine routes of passage through the grove.

**Clear road access**—Have crews clear all roads leading to parts of the grove where trees must be reset or other recovery activities must be conducted. Having a clear path for workers will speed the recovery effort.

**Water removal**—Remove excess water from tree root zones as soon as possible. It is essential to accomplish this task within 72 hours to avoid feeder root damage due to insufficient oxygen.

**Tree rehabilitation** (Figure 2)—Resetting of trees to an upright position should be accomplished as soon as possible after the storm. Ensure that employees know how to properly upright toppled trees and that appropriate equipment is available. Such equipment might include pruning saws, chain saws, front-end loaders, backhoes, and shovels. Toppled trees should be pruned back to sound wood. Painting exposed trunks and branches with white latex paint helps prevent sunburn.

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

# TROPICAL DEPRESSIONS, TROPICAL STORMS, AND HURRICANES

Florida experiences an average of two tropical cyclones each year. "Tropical cyclone" is a term that includes tropical depressions, tropical storms, and hurricanes. The difference between each of these is determined by the strength of its maximum winds.

**Tropical depression**—The sustained winds for a tropical depression are less than 39 miles per hour (mph). Wind damage to trees usually begins when the winds exceed 40 mph; only tropical storms and hurricanes will pose a wind damage threat to citrus groves. However, because tropical depressions frequently bring more rainfall than storms and hurricanes, they pose a flooding risk to citrus trees.

**Tropical storms**—Tropical storm winds are sustained between 39 and 73 mph. At these velocities, light damage to groves will occur in the form of twigs and branches broken off trees, fruit knocked off, and the first and/or second row of trees on the windward side may have an occasional tree pushed over.

**Hurricanes**—Hurricane winds are sustained at greater than 73 mph velocities and are further categorized from 1 through 5 according to the speed of maximum sustained winds (Table 1). For categories 1 and 2 (sustained wind speeds of 74 to 110 mph), moderate damage to groves will occur. The first five rows of trees to windward may have trees snapped or broken, or blown over. Mobile homes may be overturned and outbuildings demolished. For categories 3 and 4 (sustained wind speeds of 111 to 155 mph), considerable damage to groves will occur. The first 10 rows of trees to windward may be snapped or uprooted. Roofs may be torn off of frame houses, outlying buildings may be lifted and moved, and mobile homes demolished. For category 5 (sustained winds in excess of 155 mph), catastrophic damage to groves will occur. Whole groves may be uprooted and trees carried some distances. Well-constructed houses likely will be destroyed, heavy vehicles lifted and thrown, and pavement pulled from roads.

**Wind gusts and tornadoes**—Wind gusts are generally 30% stronger than the sustained winds in storms and hurricanes and greatly increase the potential for damage. There is an increased threat of tornadoes during hurricanes.

**How much rain?**—The amount of rainfall from a tropical depression, tropical storm, or hurricane is dependent on the cyclone's speed of movement. A rule of thumb to determine how much rainfall is possible is to divide 100 by the forward movement speed of the cyclone (in mph). For example, the maximum amount of rainfall from a 10 mph moving storm would be 10 inches, and for a 5 mph moving storm, 20 inches. Because tropical depressions move relatively slowly, they frequently bring more rainfall than tropical storms and hurricanes.

# CONCLUSION

Planning for a hurricane will help reduce damage to citrus trees and enhance recovery of the grove operation. The most important pre-hurricane practice is the maintenance of a regular pruning program to limit tree size. After a hurricane, being prepared for clearing debris, repairing the irrigation system, resetting toppled trees, protecting trees from sunburn when significant portion of the canopy has been removed, and irrigating and fertilizing trees frequently will increase chances of tree recovery.

### TABLE 1

## Saffir-Simpson hurricane storm rating scale.

| Category | Wind (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 |
| 5 | over 155 | Groves and orchards completely destroyed |

# Citrus Spray Programs

Dr. Jawwad Qureshi and Dr. Phil Stansly, UF IFAS- Immokalee

Asian citrus psyllid (ACP) control has been the main objective of Florida citrus growers due to its role in the spread of huanglongbing (HLB) since 2005. While some may question the value of controlling ACP in trees with high HLB incidence, replicated field studies have shown the economic benefit of maintaining young flush pathogen free. Good ACP control starts with effective dormant sprays that will control ACP when populations are low, reduce its infestation and thus HLB infection of the all-important spring flush. Pyrethroids (e.g., Danitol, Baythroid or Mustang) and organophosphates (e.g., dimethoate or Imidan) provide great winter season control of ACP. Best not to use pyrethroids or OPs again during the year except for border sprays which will reduce the need for whole block applications. Follow up with bloom sprays of labeled products to clean up stragglers. Subsequent whole block sprays should target ACP as well as other pests like rust mites and leafminers that may be problematic.

The table below provides some examples of products for different months, depending on which pests are of major concern at the time. Neonicotinoids have not been included as spray option due to their importance for controlling ACP in young trees through soil application. Make choices based on: (1) effectiveness against ACP and other pests that may be problematic, (2) avoiding repetition of any insecticide mode of action in the interest of resistance management, and (3) rebuilding and maintaining an effective natural enemy complex in the grove. Confining the broad-spectrum insecticides (pyrethroids and organo-phosphates) to the winter season and border sprays during growing season will help conserve these products as well as populations of beneficial insects and mites.

## Spray Options for Citrus Pest Management

**Dormant Season** — **Growing Season**

| Months | Nov-Dec | Jan | Feb-Mar | Apr | May - June | July - Aug | Sep-Oct |
|---|---|---|---|---|---|---|---|
| **Products**<br><br>*** Labeled for bloom** | OP[1] (e.g. Imidan, Dimethoate) | Pyrethroid[2] (Mustang Danitol Baythroid) | *Sivanto[3]<br>*Movento[4]<br>*Portal[5]<br>*Micromite[6]<br>Intrepid[7]<br>Exirel[8] | Portal[5]<br>Micromite[6]<br>Exirel[8]<br>Apta[9]<br>Sivanto[3]<br>Oil[13] | Movento[4]<br>Delegate[11]<br>Abamectin[12]<br>Knack[14]<br>Exirel[8]<br>Apta[9]<br>Sivanto[3]<br>Oil[13]<br>MinectoPro[10] | Sivanto[3]<br>Apta[9]<br>OP[1]<br>MinectoPro[10]<br>Oil[13] | Movento[4]<br>Delegate[11]<br>Apta[9]<br>Sivanto[3]<br>Oil[13] |
| **Pests** | ACP<br>Weevils | ACP<br>Weevils | ACP,<br>Mites<br>Leafminer<br>Weevils<br>Scales<br>Aphids | ACP<br>Mites<br>Leafminer<br>Weevils<br>Aphids | ACP<br>Rust mite<br>Leafminer<br>Scales | ACP | ACP<br>Rustmite<br>Leafminer |

**ACP[+++ 1,2,3,4,8,9,10] ACP[++ 5,11] ACP[+ 6,12, 13] Leafminer[6,7,8, 10,11,12,13] Rustmite[4, 6,12,13]**
**Scales[4,12,13] Aphids[3,4] Mealybugs[3,4] (+++ excellent, ++ good, + fair)**

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### ***Racial-Ethnic Background***

__American Indian or native Alaskan
__Asian American
__Hispanic
__White, non-Hispanic
__Black, non-Hispanic

### ***Gender***

__Female
__Male