UNIVERSITY OF GEORGIA
EXTENSION

Hurricane and Storm Damage to Greenhouses and Greenhouse Crops

Julie Campbell, Assistant Professor; Emphasis: Consumer Horticulture & Consumer Behavior
Ping Yu, Assistant Professor; Ornamental Extension Specialist; GGIA & CANR Faculty Liaison

Circular 1353 published on June 20, 2025

Hurricanes and Powerful Storms can Cause Damage in a Matter of Minutes

Figure 1. Hurricane Damage to Greenhouses. Photo: Windham Greenhouses.

Hurricanes can cause severe damage to greenhouse structures and crops, both directly and indirectly (Figures 1–5). Strong winds, heavy rains, and flooding not only impact physical

infrastructure, but also damage crops through exposure to extreme conditions. Additionally, disruptions to water, electricity, and logistics complicate production efforts.

Figure 2. Roof and Structural Damage. Photo: Sunbelt Greenhouse.

This publication outlines common types of hurricane damage in greenhouses and provides recommendations on how growers can minimize the impact of such storms. Greenhouse crops typically are annuals or perennials with high aesthetic value, such as flowers and foliage, and are grown in smaller containers than nursery crops like shrubs and trees (Nelson, 2012). These crops, because of their cultivation in controlled environments, are often more sensitive to environmental changes than field-grown nursery crops. Greenhouses protect plants from harsh weather, but during a hurricane, the damage can be devastating.

The Impact of High-Speed Winds

Figure 3. Irrigation Systems may be Damaged and Disrupt Watering. Photo: Windham Greenhouses.

Hurricanes are characterized by sustained winds exceeding 74 mph (NOAA, 2024). When high winds hit a greenhouse, the structure may not be able to withstand the pressure. For example, a 60-mph wind can create a lifting force of around 18,000 lb on a 25-ft-wide hoop house (Bartok, 2015). Given high or sustained winds, a structure may collapse if not properly reinforced or if the poly coverings are left on. Removing poly films in anticipation of high winds can prevent extensive damage, but offers no protection to plants from lower wind speeds.

Figure 4. Structural Damage and Physical Damage to Plants. Loss of square footage can be an issue after a storm like this. Photo: Windham Greenhouses.

Structural damage can occur when wind speeds exceed 50 mph. The likelihood of damage increases significantly for structures that are not designed for such conditions (Roos, 2008). If not properly anchored or secured, greenhouses can be partially or completely flattened by wind forces. The primary structural damage often results from ripped coverings, broken frames, and

collapsed walls, which expose plants to the elements.

Crop damage can occur once the structure is compromised, and greenhouse crops become vulnerable to wind, rain, and flying debris. Wind can tear leaves, shred flowers, and break branches. In some cases, entire plants are uprooted, leaving them exposed and susceptible to disease and pests. Constant gusts of wind also pull moisture away from foliage, leading to leaf desiccation, wilting, and browning at the edges.

Figure 5. Greenhouse Roof Damaged by High Winds (at McCorkle Nursery). Photo: Georgia Farm Bureau.

Stages of Greenhouse Crop Damage

Figure 6. Plants May Show Physical Damage and Dehydration if not Tended Immediately. Photo: Windham Greenhouses.

Greenhouse crops often face multiple stages of damage after a hurricane event. Understanding these phases can help growers develop a comprehensive recovery plan.

Initial Damage — First Week Post-Hurricane

During the initial week, immediate damage is visible, particularly in succulents and crops with fragile stems or leaves, such as poinsettias. Broken leaves, stems, and torn-off flowers are common, rendering plants unsalable, especially for seasonal crops.

Figure 7. Plants Blown Over During a Storm Event. There is potential for physical damage as well as dehydration. Photo: Windham Greenhouses.

Additionally, damaged water and electricity lines leave crops without essential irrigation, and rain may wash away nutrients from the substrate, further stressing the plants. Container plants are particularly susceptible to drought stress if irrigation systems do not come online quickly. Container plants often must be watered daily to prevent damage from drying out.

Figure 8. Greenhouse Plants Blown Over During a Hurricane. Photo: Windham Greenhouses.

Midterm Damage — Second Week to Several Months

Midterm damage typically manifests after the first week. Plants that survive the initial wind damage may start to show symptoms of moisture loss, such as wilting or browning. Wind exposure often leaves crops misshapen, requiring additional labor to prune or reposition them. Tipped or uprooted plants lose essential nutrients, and their root systems may become compromised. Any new growth is at risk of cold damage if not moved to a protected environment before the first frost (Figures 6–9).

Long-Term Damage — Several Months to 1 Year

Figure 9. Replacing Infrastructure May Delay Production for Future Seasons. Photo: Windham Greenhouses.

In the long term, plants become more vulnerable to diseases and pests. Damage to leaves, stems, and roots provides entry points for pathogens and insects, which can spread quickly in a greenhouse environment. Infrastructure repairs may take months, and in the meantime, pest management is more challenging. Growers face increased costs for treatments, labor, and the potential for reduced crop quality over time (Figure 10).

Assessing Storm Damage

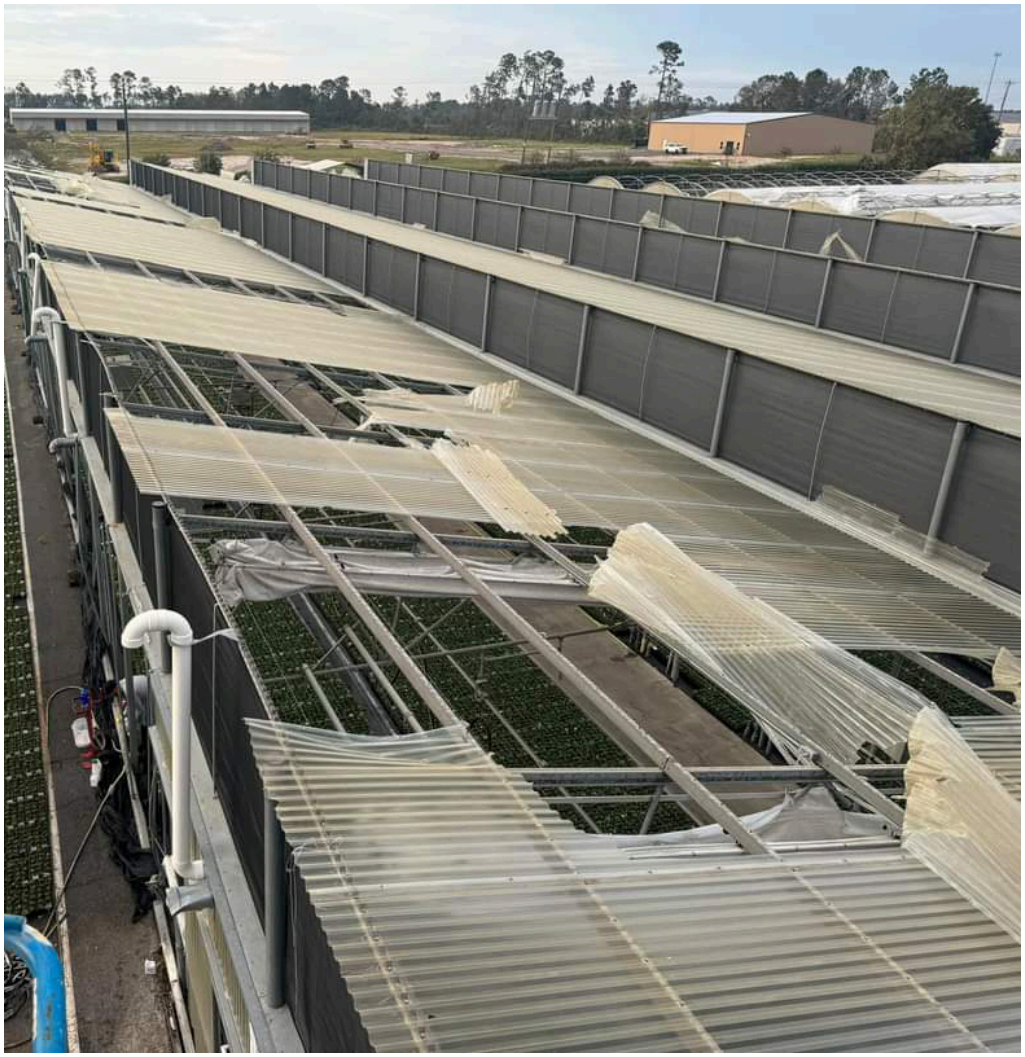

Figure 10. Roof Damage Exposes Growing Plants to Direct Sunlight. Photo: Sunbelt Greenhouse.

Collecting photographs, videos, and other paperwork right away is essential and will make it easier to file any claims you may have with insurance or other assistance programs.

In the aftermath of a hurricane, greenhouse growers should work closely with insurance adjusters to document both plant and infrastructure damage while assessing the cost-effectiveness of rehabilitating versus replanting crops.

The Economics of Plant Damage in Greenhouse Production

After a major wind event such as a hurricane, greenhouse growers face unique challenges that

can significantly impact both short-term revenues and long-term profitability.

Although plants within the greenhouse may not immediately appear to be a total loss, their salability and growth potential can be compromised. Growers should assess and document plant health and structural damage immediately following the event and continue this documentation over the following months, and in some cases, throughout multiple growing cycles. Damaged plants are at an increased risk of pest and disease infestation because of their weakened conditions, which can affect subsequent crops and spread throughout the greenhouse if not properly managed.

In many cases, the cost of rehabilitating damaged plants, including the increased labor and time required to restore them to a marketable condition, may outweigh the economic benefits of continuing their production. Growers should take these additional production costs into account, especially when discussing insurance claims related to crop damage. It may be necessary to cull severely affected plants to avoid further infestations or the spread of disease.

Aside from plant damage, growers must also consider potential losses related to the greenhouse structure and essential inputs. High winds can damage greenhouse frames, glazing, and ventilation systems, which are critical to maintaining optimal growing conditions. Damage to heating, cooling, and irrigation systems may interrupt climate control and plant hydration, potentially resulting in temperature stress, drought, or flooding of crops. Additionally, power outages can cripple essential systems like pumps, fans, or lights, leading to significant production downtime and plant stress.

Another critical area of concern is the loss of input. Containers can be tipped over, spilling media, fertilizers, or herbicides. In such cases, the loss of nutrients or preemergence weed protection will require prompt remediation, including reapplication of fertilizers or manual weeding. Exposed pesticides, nutrients, and growing media may be rendered unusable if damaged by water or wind, adding to input costs. Growers must also remain vigilant about potential contamination of inputs that remain in compromised storage conditions.

Best Practices for Hurricane Preparation

To mitigate the effects of hurricanes on greenhouse operations, growers should:

- **Document Pre-Storm Conditions:** Take photos or videos of infrastructure and plant materials to be able to compare conditions before the storm to damage afterward.
- **Reinforce Greenhouse Structures:** Inspect and secure all frames, poly films, and glazing before hurricane season. Remove coverings if high winds are forecasted.
- **Floodproofing:** Ensure proper drainage around greenhouses and use sandbags to prevent water intrusion.
- **Protect Crops:** Move sensitive plants indoors or to more secure locations. Harvest crops before the storm if possible.

- **Prepare for Power Outages:** Have a backup generator ready to maintain essential systems, such as ventilation, cooling, and irrigation.

Hurricane and storm damage can impact your business not only in the short term but also may have long-lasting effects on production. Timely cleanup and restoration are important to lessen any lasting impacts.

After the hurricane, it's essential to assess damage to both structures and crops immediately. Repairing structural damage should be prioritized to restore environmental control. Crop recovery may involve pruning damaged sections, replanting where necessary, and monitoring for disease or pest outbreaks. Document all damage for insurance purposes and consider the long-term viability of rehabilitating crops versus replanting.

Check in with your county Extension agent, state associations, and other relevant agencies to keep up with any emergency programs that may provide financial or other assistance. Keep records of all expenses and document your process of recovery. This will be essential if you have substantial damage and intend to use one of these programs.

Conclusion

Hurricanes pose significant risks to greenhouse production, from physical infrastructure damage to long-term crop health issues. By understanding the types of damage that occur during and after a storm, growers can take proactive measures to safeguard their crops and reduce economic losses. Proper preparation and timely recovery efforts are crucial to maintaining a successful greenhouse operation in the wake of a hurricane.

References

Bartok, J. W., Jr. (2015, January 31). *Reducing storm damage to your greenhouses*. University of Connecticut Extension. https://publications.extension.uconn.edu/2015/01/31/reducing-storm-damage-to-your-greenhouses/

Nelson, P. V. (2012). *Greenhouse operation and management*. Prentice Hall.

NOAA. (2020). *Hurricanes*. https://www.noaa.gov/education/resource-collections/weather-atmosphere/hurricanes

Roos, D. (2008, September 4). *Hurricane preparedness for producers of horticultural crops*. NC State Extension. https://growingsmallfarms.ces.ncsu.edu/growingsmallfarms-hurricanes/

Circular 1353 Published on June 20, 2025

Published by University of Georgia Cooperative Extension. For more information or guidance, contact your local Extension office.