

# DRAFT Forage Crop Producers Guide to Preparing for and Recovering from Hurricanes in the Southeast U.S.

*This is a draft of guidance being developed by the USDA SE Climate Hub to help forage crop producers prepare for and recover from hurricane damage.*

This section will focus on:

- Preparing forage crops, conserved forage, and grazing areas for potential hurricane damages
- Alleviating hurricane damages on forage crops and grazing lands - the aftermath

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## I. Pre-Hurricane Planning – Long-term Preparedness

### Initial Site Planning

- Plan which forage crops should be planted according to the specific ecological conditions within the farm. Areas prone to temporary waterlogging conditions due to storms should be planted with forage species tolerant to these conditions. Limpograss (*Hemarthria altissima*) is an example of a forage species tolerant to temporary flooding and adapts well to South-Central Florida and along the Gulf Coast.
- Areas susceptible to salt water intrusion should be planted with more salt-tolerant forage crops. Bermudagrass (*Cynodon dactylon*) could be an option.
- Conserved forages (i.e. hay, haylage, silage) must be kept in higher ground to avoid flooding. Hay should preferably be stored in a hay barn.

### Site Establishment

- During the site establishment and design, pastures should be separated from forested areas. Scattered trees on the pastures are important, but areas heavily densely populated with trees must be avoided, especially during the hurricane. Falling trees can cause accidents, killing livestock during the storm.
- Design an internal paddock in a higher area with access to drinking water and near the hay barn or feeding facility. External fences typically go down during the hurricanes. A smaller area easier to repair the fences to keep and to feed the cattle during the storm is important to prevent cattle from leaving the property. Make sure you have a generator if pumping water from a well.

### Seasonal Considerations Outside of Hurricane Season

- Before getting to the hurricane season, make sure the generators for pumping water from wells are working properly.
- Consider doing strategic tree pruning to reduce damages to forage storing facilities and equipment barn.
- Keep the fence lines with as less trees as possible. Trees are the major cause of damage on fence lines.

- Make sure you have enough stored forage (e.g. hay, baleage). You may need to use a large amount of it during the hurricane season because the fences are down and you need to keep the cattle confined in a smaller area.

### **Monthly Considerations During Hurricane Season**

- Make sure you have enough forage mass in the grazing lands and stored forage during this season. If a hurricane hits, it will be difficult to find feed and other supplies to purchase.
- Check the stock of inputs you typically use such as fertilizers, haying supplies, fuel, lubricant, herbicides, pesticides, and other crop inputs. During a hurricane these supplies may not be available to buy.

### **Annual Considerations**

- Develop a guideline and train the personnel with a systematic procedure, assigning individual responsibilities in case a hurricane hits the property.
- Annual training with the personnel addressing the standard operational procedure in case a hurricane hits the farm.
- Insure equipment and facilities related to forage crop production.

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## **II. Pre-hurricane Planning – Short-term Preparedness**

### **When a Hurricane Is Forecast to Impact Your Area (1 to 7 days before)**

- Make sure you fuel up all your vehicles and equipment. Gas will become scarce when hurricane hits.
- Inspect the fence lines and prune trees that are endangering facilities and fence lines.
- If weather permits, harvest and conserve forage crops that might be helpful to feed animals during the storm.
- If crops are in an area that will likely result in total loss due to flooding, harvest it ahead of time and try to conserve as hay. If conserving the forage is not practical, consider putting the animals to graze it before total losses from hurricane occurs.
- Test all generators and wells.
- Put hay bales and equipment on higher ground to reduce risk of flooding.
- If possible, store irrigation equipment in a safe place.
- Artificial shades must be tightened up to minimize wind destruction and further destruction of fence lines.

## **One Day Before a Hurricane is Forecast to Impact Your Area**

- Connect generators with water pumps and essential buildings. Make sure all essential equipment have enough fuel.
  - Disconnect electrical power to all buildings that may be subjected to flooding.
  - Move equipment and machinery to higher ground.
  - Move cattle away from forested areas. Keep them in the inner paddock. Make sure they have enough hay and that water is available.
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## **III. Post-hurricane Recovery**

### **Immediately After the Hurricane has Passed**

- Take an inventory of the livestock herd, and identify any missing or injured animals.
- Downed and damaged fences are likely after a hurricane. It is important to restore some type of temporary fencing as soon as possible in order to keep livestock contained.
- Watch for downed power lines, debris and other hazards.
- Examine pastures and hayfields and remove dangerous debris such as strands of barbed wire, chemical bottles, insulation and trees.
- Some tree species can potentially cause diseases in livestock that consume their leaves or nuts. These include buckeye, wild cherry and oak. Make sure that livestock do not have access to downed trees of these species.
- Livestock must have an adequate supply of fresh water to survive. Water consumption needs are particularly high during hot weather conditions.
- Make sure livestock have access to forage or other roughage, along with free-choice, quality mineral supplements.
- Monitor pastures and hayfields for the approximate amount and duration of flooded conditions.

### **Within a Week Following Hurricane Impacts**

- Leave livestock in the inner portion of the farm and make sure the area is fenced.
- Start rebuilding perimeter fences.
- Document damage with photographs to assist with insurance recovery purposes.
- Make sure livestock has enough forage, fresh water, minerals, and shade.

### **Within a Month Following Hurricane Impacts**

- Flooding Concerns in Pastures

Hurricanes have the potential to bring large amounts of precipitation to certain areas or regions in a short amount of time. Flood damage to pastures can be quite variable depending on several factors, such as time of year, temperature, soil texture, flood duration and water movement. Flood events of one day or less usually have low impact on plant survival. Damage to plants is usually less in areas of moving water compared to standing, stagnant water. Sedimentation on leaves and crowns in standing

water increases injury. Damage from flooding is also reduced if the plants are not completely covered by water. Plant damage usually increases with increasing time of water submersion. Plant species that have good potential to survive flooding include bermudagrass, bahiagrass, dallisgrass, switchgrass and eastern gamagrass. Pasture plants with typically low survival from extended flood damage are small grains, annual ryegrass and most forage legumes. Tall fescue has a moderate potential to survive flooding, as long as water submersion lasts no longer than one or two days. Severely damaged stands will require patience for adequate recovery. These stands could fully recover with proper weed control, proper soil fertility and deferred grazing.

- Damage to Hay

Producers should assess their hay resources as soon as it is safe to do so. Water has a very detrimental effect on hay quality. Hay that has been flooded with more than about one foot of water normally has significant damage. The amount of rotted hay, mold and possible contaminants in flooded hay makes it of little value, and potentially hazardous to feed to livestock. Hay that was flooded in storage barns should be removed as soon as possible because it will start to heat and spontaneous combustion is a real possibility. This hay could be used for erosion control or composted, but likely will have little usable feed value, depending on how much water was absorbed. Any hay that was severely damaged by flood and determined to not be suitable for feeding should be disposed of by burning or composting. Feeding moldy hay should be avoided as illness or decreases in animal production and reproductive fertility may occur.

- Saltwater Intrusion Concerns

Flooding during hurricanes can occur via heavy rainfall and/or seawater brought onto land from high winds. Flooding of pastures with seawater can cause salt buildup in soils, which reduces forage growth. The capacity of forage plants to grow satisfactorily in salty conditions depends on several interrelated factors, including the plant's physiological condition, growth stage and rooting habits. All soil contains some water-soluble salts. Plants absorb essential plant nutrients in the form of soluble salts, but excessive accumulation of soluble salts, called soil salinity, suppresses plant growth. When soil salinity exceeds a plant's tolerance, growth declines. Reduced growth caused by salinity is a progressive condition that increases as the salinity rises above a plant's tolerance threshold.

Symptoms of salt injury in plants resemble drought. Salt injury and drought are characterized by water stress (wilting) and reduced growth. As salt concentration rises, water becomes increasingly difficult for the plant to absorb. A plant can actually die from water stress (i.e., lack of available water) in a moist soil if the salt concentration becomes high enough. Severe injury caused by prolonged exposure or high salinity results in stunted plants and tissue death.

Pasture plants commonly grown in the southeast region vary in their tolerance to salty conditions. Bermudagrass is generally considered to have a high salt tolerance. Some research indicates that bermudagrass can tolerate salt concentrations of up to 5,000 parts per million (ppm) for extended periods. Other perennial forage species such as bahiagrass and carpetgrass aren't as salt tolerant, but in relative terms, they are still considered to be salt tolerant. Most cool-season forage species such as tall fescue, annual ryegrass, wheat and barley are considered to be moderately tolerant to salty conditions. Most clover species, including white, red, arrowleaf and crimson are considered to be salt sensitive. The

rate of recovery of pasture plants after saltwater intrusion is dependent upon how fast the salts can be leached out of the root zone (0-6 inches of the soil). Rainfall is a major factor in reducing salinity because it leaches the salts from the soil. In fact, five inches of rainfall will remove about 50 percent of the soil salts. Therefore, frequent rainfall events in the weeks and months after a hurricane will help to expedite pasture recovery.

Soil salinity is a big concern when attempting to plant winter annuals such as ryegrass in the fall months into areas that have received some level of saltwater intrusion. In general, forage seedlings are much more susceptible to salt injury than are mature plants. In the fall of 2005 after hurricanes Katrina and Rita hit the southern coast of Louisiana, scientists from the Louisiana State University Agricultural Center established the salinity threshold for seedling ryegrass as being 1,800 ppm.

Producers can determine the salt content of their soils by taking soil samples and then sending them to a public or private soil testing laboratory for determination of salt levels. If a laboratory isn't available, producers can perform a simple experiment (bioassay) on their own with a small amount of soil from affected areas before planting large acreages of forage crops. Take soil samples in the top 3 inches from several locations in the field suspected of having high salt content. Mix the soil samples together in a clean plastic pail. Take the soil and place it into smaller containers such as boxes, milk cartons or cottage cheese containers. Sprinkle a small amount of seed (about a teaspoon) in each container of soil and cover the seeds with about ½ inch of soil. Wet the soil with water, but do not saturate it. Within 7 to 10 days after planting, injury symptoms should become apparent. Possible symptoms include no germination, partial germination, slowed emergence or seedlings appearing to be dried out. Although this is not a precise experiment, it should provide an idea of how various forage species may germinate and grow in areas affected by saltwater intrusion. Producers can then take information obtained from this bioassay to make decisions relative to planting small to large acreages of winter annual forage crops.

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**This draft guidance was developed by subject matter experts from the University of Florida and Louisiana State University**