

# DRAFT Soybean Producers Guide to Preparing for and Recovering from Hurricanes in North Carolina and Virginia

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

This section will focus on:

- Recommendations for managing soybean to minimize hurricane related-damage

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

### Initial Site Planning

- *Spread soybean maturity groups and planting dates on your farm to mitigate risk from hurricane-related damage.* Soybean at all growth stages can be negatively impacted by hurricane-related damage.
- Prolonged periods of flooding can speed up maturity.
- Certain stressors can be worse at earlier soybean growth stages or later soybean growth stages. Earlier maturing varieties are likely to be impacted by delayed harvest, pre-mature sprouting, and potential shattering. Later maturing varieties may be impacted by inhibited seed development, disease pressure, and reduced quality.
- If you have a range of soybean maturity groups planted on your farm, it reduces the risk of your whole soybean crop being adversely impacted by a hurricane at one growth stage. There are additional agronomic benefits to spreading your soybean maturity groups if you can manage this with the other crops in your rotation, including spreading risk with earlier season weather issues (ie drought, excess moisture).
- In flood- or hurricane-prone-areas, consider planting early-maturing varieties early in the planting season. This system will allow soybean to be harvested in September, avoiding late-season hurricanes.
- *Select soybean varieties with robust disease resistance.* Disease can be worsened by periods of flooding, significant rainfall, and damages from wind, hard rain, or hail. In periods of extended flooding, root rots caused by *Phytophthora sojae* or *Pythium* spp. or other fungal pathogens like *Fusarium* spp. may cause significant losses. Foliar diseases from prolonged exposure to high moisture, including Frogeye Leaf Spot, Cercospora Blight, Rust, or Bacterial Blight, may threaten yield and quality of soybeans following hurricanes. Selecting varieties with resistance to disease(s) will limit losses from conditions that favor those pathogens.

- *Follow recommended seeding rates for your location and planting date.* Too high of a seeding rate will reduce stem size and increase lodging potential.
- *Ensure uniform seed spacing in the row.* Non-uniform seed spacing will increase lodging potential. Planting with standard drills (non-uniform placement) will usually result in more lodging.
- *Rotate soybeans with other crops.* Not only are there generally yield advantages to rotating soybean with other crops, but some of the seed quality issues associated with excessive rainfall from hurricanes, such as phomopsis seed decay and purple seed stain, are reduced through rotation. Some of these diseases reside in the soil on residues from previous crops; rotating crops can reduce residue levels for the disease to carry over and affect the next crop.
- *Understand flooding history of owned and rented fields.* Predictable patterns of flooding may provide important insight into which fields are at risk for additional damage during significant weather events. The State of North Carolina provides valuable geospatial flood risk information through the North Carolina Flood Risk Information System (<https://fris.nc.gov/fris/Home.aspx?ST=NC>). Information available through this website can be useful to understand field-scale flood hazard data and risk assessments in the event of a significant weather event. Prioritizing risk prevention strategies before storms occur can be an important step to mitigate flood-related losses.

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

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

- *Harvest as soon as soybean approach fully maturity (R8 stage) if storage and drying facilities are available.* If you have soybean ready for harvest, getting them out of the field prior to the hurricane is the best chance to minimize damage. If you have storage facilities where high-moisture soybeans can be dried, utilize these resources.
- *A desiccant may aid harvest.* Fast acting desiccants such as sodium chlorate and saflufenacil (Sharpen) will rapidly desiccate soybean, aiding harvest. Soybean treated with Sharpen can be harvested three days after application, and soybean treated with sodium chlorate can be harvested as soon as they are ready, usually within 7 to 10 days.
- *Strategically think about pesticide applications.* Sometimes heavy rains and flooding can eliminate problems from caterpillar pests, especially late in the season when they are subject to diseases. Other times, problems will persist despite the weather and returning to the field can be difficult in waterlogged situations or if vehicle transport is limited. Furthermore, if insecticides are applied using ground equipment, there may be more damage potential from tires after a storm, when plants are twisted and rows are indistinct.

- Fungicide applications are necessary before pathogen damages are visible, and may be most effective prior to a hurricane. Therefore, a safer bet is to address any potential issues before a hurricane rather than adopting a wait-and-see strategy.
- Prioritizing near-term management decisions before a storm will be important. Fields that are located in flood-prone locations may not benefit from pesticide sprays if significant crop losses are anticipated. Planning to spray fields with the highest odds of post-storm harvest first may be important to maximize application efficiency and protect the most promising fields to reduce additional economic loss across the farm.

### III. Post-hurricane Recovery

#### Within a Week Following Hurricane Impacts

- *When safe, closely inspect fields where flooding has occurred.* Three to four days of continuous flooding can cause irreversible damage in soybean and subsequent yield declines. In addition to agronomic damage, flooded grain could be considered altered by your insurance company depending on flooded water source. Completely submerged pods have the potential for toxin contamination and some insurance policies may allow for zero appraisal following this situation. This situation may require entry into non-traditional markets if grain is determined sellable.
- Diseases will likely develop if the soybeans have been flooded for 3-4 days; sprouting in the pods is possible under these conditions. If your fields have been flooded with off-farm water sources, be aware of weed seed that could have been carried in that has not traditionally been a problem on your farm and be aware of the management implications from this in subsequent seasons.
- *Document damage with photographs to assist with insurance recovery purposes.* Remember that “a picture is worth a thousand words”.
- *Check with your crop insurance agent.* It is important to check with your crop insurance adjuster as quickly as possible to decide on the best plan moving forward with your potentially damaged soybean crop.
- *If soybean is still between R3 (beginning pod) and R5 (beginning seed) and you can safely enter the field, a fungicide application may be warranted and could help prevent seed quality issues.* Leaf diseases (Frogeye Leaf Spot, Rust, Cercospora Blight, Brown Spot, and others) and root rots (*Phytophthora* and *Pythium*) will likely be more severe after excessive rain and flooding. Fungicides applied for seed decay organisms, including Phomopsis seed decay, may reduce damages to seeds between R3 and R5, but will not likely impact yield.
- *Scout your soybean for lodging.* Soybean lodging can be caused by strong winds and by water flow across the field. The effect of lodging on soybean yield is variable, but soybeans in the beginning seed stage (R5) will likely be more prone to damage from

lodging than soybean that are further into physiological development. There are two types of yield losses associated with lodging including restriction of maximum physiological development and harvest loss. Restriction of maximum physiological development can occur from lodging reducing photosynthesis in the upper, more productive leaves. Harvest loss from lodging can range from 3-10% (Holshouser, 2015). Slowing down the combine and harvesting in the opposite direction of the lodging may reduce harvest losses from lodged soybeans. Lodging is more likely with higher yielding soybeans.

- *Check soybean for maturity.* Flooding of soybeans will likely lead to premature defoliation that can speed up maturity. Be ready to harvest mature soybean when field conditions allow.

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

- *Check soybean for quality declines and develop a selling plan accordingly.* Soybean that has been under flooded conditions for several days have an increased risk of being contaminated by things such as diseases and mycotoxins caused by disease. Excessive rainfall can cause pod splitting. This is especially problematic if the excessive rainfall followed a dry spell. When soybeans are at R6 (full seed) or R7 (physiological maturity) and receive excessive rainfall, rapid seed growth can cause pod splitting, especially when pods are small due to earlier season stressors. Premature seed sprouting is generally rare but can be an issue when the moisture of the seed drops below 50%, and then goes back above 50%.
- *Scout fields for soybean shatter:* Shattering is intensified when dry pods are rehydrated by excessive moisture followed again by a dry period. Shattering losses can be more severe with earlier maturing varieties that are close to physiological maturity and are ready for harvest. Unfortunately, the flooded conditions may restrict field access in some areas, and this delayed harvest can intensify shattering. If you have a field where harvest shatter is a problem, harvesting that field as early as possible, starting earlier is the day when the plant material still has some moisture, and slowing down combine speed may all reduce losses from shatter. If growers have fields where significant shatter has occurred, they should be prepared to manage soybean regrowth the following year by rotating to production of a different crop in that field where soybean regrowth could be terminated through another herbicide chemistry. If rotating to a different crop is not possible, the soybean herbicide trait package should be rotated or the grower should plan to plant the next crop of soybean after regrowth of the shattered soybean has occurred (this can be difficult to predict) and can be terminated via herbicide application.
- *Devise an alternative storage plan for damaged soybeans.* If you have a diversity of soybean maturity groups and varieties planted on your farm, chances are you will have differing levels of soybean damage among your fields. Field to field damage will also vary depending on proximity to flooded water sources. If possible damaged grain should be stored separately for undamaged or minimally damaged grain to ensure high quality grain can be sold without dockage.

- *Take a soybean sample to the elevator or buying point to assess damage and determine if selling is an option.* This can prevent you from paying the freight cost to get the soybeans to the buying point if ultimately they will not be purchased.
- *Investigate soybean marketing options:* Excellent resources are available on marketing flooded grain after Hurricane Florence from Dr. Nick Piggott at the following link: <https://cals.ncsu.edu/are-extension/2018/09/18/marketing-flooded-grain-after-florence/>
- *Once flood-waters have receded, soil sample your fields to understand fertility impacts.* Both flooding and excessive rainfall can lead to nutrient leaching and limit subsequent nutrient availability. Soil samples should be taken following a hurricane to ensure correct fertilization of hurricane affected fields in the following season.

**This draft guidance was developed by subject matter experts from North Carolina State University Extension Services and Virginia Tech Extension Services**

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