After the Flood: Row Crop Replanting

The U.S. Army Corps of Engineers estimates floodwaters covered approximately 185,000 acres of row crops in the Mississippi Delta during late May. As the water recedes, producers are facing decisions about how to manage their cropland the rest of the 2011 growing season.

Mississippi State University Extension Service agronomic crop specialists and Mississippi Agricultural and Forestry Experiment Station researchers have compiled the following information on late-season planting and crop management. Also included is post-flood crop insurance information.

Post-Flood Soil Fertility

The bioavailability of most plant nutrients is very dynamic as soils transition from flooded to normal conditions. Soil testing remains the foundation of nutrient management.

Since the flood has altered farming landscapes, soils from these fields should be tested before the 2012 growing season even if they were tested going into 2011. The sampling should be done after the soils have dried sufficiently to allow good sampling. Previous soil test results can be used in fertility management for crops planted this summer.

Nitrogen

It is likely that most of the nitrogen (N) fertilizers applied before the flood have been lost except in some special situations. Soybean seed planted after flooding should definitely be inoculated, regardless of whether soybeans have previously been grown.

If nodulation is hindered or delayed, relatively small N applications may provide a temporary supply. However, proper nodulation is necessary for soybean nitrogen fixation and normal plant growth.

Phosphorus

Phosphorus (P) deficiencies in fibrous rooted crops such as corn are often seen in post-flood soils, regardless of high soil test levels. These P deficiencies are caused by several factors, including less soluble iron and aluminum phosphates in post-flood soils, and diminished activity of mycorrhizal fungi that are essential in P nutrition and uptake. These fungi colonize the roots of the host plants and greatly increase the nutrient and water uptake of the plants.

Tap-rooted crops such as soybeans and cotton grown in the same situations are affected less, but the same principles apply. Soils will recolonize with the fungi in the first few weeks after the flooding subsides. Therefore, if soil test P levels were adequate for soybean before flooding, they should remain adequate after the flood. If soil test P was low or unknown before the flood, P fertilization should be considered.

Potassium

Flood-related potassium (K) issues are rare, although K may leach in sandy, low cation exchange capacity (CEC) sandy soils during the flood. If the CEC of the soil is 8 or less, K fertilizer may be beneficial.

Other Nutrients

Sulfur (S) also may leach in sandy soils. However, S will mineralize and become available from the organic matter in the drying soils. Micronutrients should not be an issue as the soils dry. In fact, some may be more bioavailable in the soil following the usual shift of soil pH toward 7.0 during the flood.

MISSISSIPPI STATE UNIVERSITY
EXTENSION SERVICE

Crop/Residue Management After Floodwater

Most crops in fields inundated with floodwater for a week or more will likely die. However, early-planted corn that attained considerable height before the flood could live, if water does not submerge plants. Prolonged flooding will likely stunt growth and severely reduce potential corn productivity, depending on the duration of flooding, air temperatures (high temperatures increase stress), and corn growth stage.

Ear size determination begins during mid-vegetative stages, and grain yield is extremely sensitive to any stress during pollination. Considerable root damage will likely occur, which may further jeopardize plant health when soils dry.

Large corn or wheat that remains after water recedes could restrict fieldwork and replanting of subsequent crops. Live or upright corn stalks could be mowed and allowed to dry for several days.

Dry corn, wheat, or other residue remaining in fields could then be burned, if necessary. Burning would promote quick, efficient planting of another crop, particularly for dryland fields that may not require tillage or raised-bed reconstruction. It also could save valuable soil moisture, compared to multiple primary tillage operations, such as disking.

All weeds should be killed with either herbicides or tillage before planting.

Potential for Crop Damage from Herbicide Carryover in Soil

It is difficult to accurately predict the potential for crop injury associated with herbicide carryover in flooded soils. In general, most herbicides degrade fastest in warm, moist soils where microbial activity is high. In oxygen-limited (anaerobic) conditions, as occurs in soils inundated for several days, herbicide degradation often slows, increasing carryover potential. For example, this occurs with products containing the active ingredient atrazine.

Other herbicides, such as those containing trifluralin, may actually degrade faster under flooded conditions, while degradation rates of products containing rimsulfuron (Resolve®) appear to be unaffected by flooding.

Less is known about the increased carryover potential under flooded conditions of products containing mesotrione (Callisto®), such as Halex GT®, Lexar® or Realm Q®. Anecdotal reports from flood-prone areas along the Ohio River in Illinois observed no atrazine or mesotrione injury in June-planted soybean following flooded corn. Consider each field and cropping situation individually. However, it should be noted that herbicide labels and restrictions apply whether or not flooding has occurred. If any residual herbicide was applied before flooding, label restrictions and plant-back intervals will need to be adhered to when replanting crops.

Chemical analysis of soil can help determine if an herbicide is present at a detectable concentration, but most laboratories cannot tell if a detection will necessarily result in crop injury. The most straightforward approach to test for potentially harmful herbicide residues is to perform an *in-field bioassay*.

Producers in flood-prone areas report successfully performing in-field bioassays to answer replant questions. To conduct the bioassay, hand-plant some seeds as soon as water recedes, even while lower portions of the field remain flooded.

As the field dries over the next 7–14 days, look for herbicide injury and successful emergence. Emergence failure or chlorosis in the first true set of leaves likely suggests herbicide carryover. For further assistance, contact your county Extension agent or the appropriate agronomic crop agent from the list at the end of this publication.

Effect of Growing Season Length on Cropping Decisions

Cropping decisions after this season's floods may be limited by the length of the growing season, depending on when water recedes from fields and they are ready to plant.

We could see a shortened growing season, depending on when water recedes from fields and they are ready to plant. A shortened growing season limits cropping decisions.

Although Southern growers rarely face this issue since we are blessed with long growing seasons, frost occurring before crop maturity can drastically limit productivity and commodity quality.

The first fall frost at Yazoo City has a 10 percent probability level of occurring on October 30; that level reaches 50 percent by November 14. Thus, crops with long growing season requirements, such as corn, cotton, and rice, may not be practical options at late planting dates.

Also, a late-fall crop harvest could hamper grain drying and cause rutting of fields, if conditions are rainy and fields are muddy at harvest. This outcome could restrict fall tillage operations and damage fields, prohibiting implementation of stale seedbed systems or other reduced tillage systems that we use to promote timely spring planting. As a result, a late crop this season could have lingering harmful effects on next season's crop.

Evaluating Crop Options

Soybean

Soybean is likely the best post-flood cropping option because the growing season generally fits and soybean has a proven track record when planted late, for double-cropping, and after floods. Soybean also is the most common crop grown on flood-prone soils.

Planting after a major flood is a unique situation where soybean historically has been rather productive. This response is largely dependent on moisture from the floodwater fully charging the soil profile, which enhances moisture availability well through the season. The soybean tap root system likely enhances its ability to use this soil moisture as well.

Soybean grows and flowers quickly in warm summer temperatures and, when planting after a flood, may yield about 80 percent of normal plantings (35–55 bu/a). Soybean is not particularly sensitive to high nighttime temperatures, compared to corn, so it is capable of maintaining productivity relatively well when high temperatures persist during reproductive development.

Maturity group V and VI soybean varieties are generally more productive when planted in June, compared to earlier varieties. However, group V and VI varieties require nearly 120 days to mature, so you may need to consider group IV varieties if planting is delayed into July.

Management Tips for Late-planted Soybean

- Planting soybean in narrow rows will likely increase productivity in a post-flood cropping system because it will promote quicker canopy closure, help control weeds, and improve light interception.
- Late-planted soybean seeding rates should be increased 10 percent above normal rates. This will offset potential losses from seedling disease, increased insect pressure, and shorter soybean plants.
- Rhizobium inoculation of soybean planted after flooding is strongly suggested.
- A seed treatment fungicide should be applied since flooding may increase *Pythium* populations. Choose a seed-applied fungicide that is compatible with the soybean inoculant. For a table of compatible seed-applied fungicide and inoculant combinations, please refer to the Mississippi Crop Situation blog (***http://www.mississippi-crops.com/***).
- Floodwater may increase the possibility of new weed infestation. Many weed species, including pigweed, have seeds that float, increasing the likelihood of movement with floodwater. This makes a sound resistant-weed management program extremely important. A list of recommended herbicide programs for managing glyphosate- and ALS-resistant pigweed in soybeans is available at ***http://msucares.com/crops/weeds/pigweed.pdf***.
- An R3/R4 fungicide application could be beneficial on post-flood soybeans, due to late-season diseases such as Cercospora and soybean rust. A full rate of a strobilurin (6 fl oz/A) may be more beneficial than the 4-ounce rate that is typically applied in our production area. In addition, a 6-ounce rate applied at approximately R4 will likely provide disease prevention through R5.5 or R5.7, which may be long enough to prevent the need for a second fungicide application.

Insect Management Considerations for Post-flood Soybean

Insect pest pressure will likely be much higher than normal on post-flood planted soybean. This alone should not deter post-flood soybean planting, but it will require more intense management. It is highly recommended that a consultant monitor these crops at least weekly to scout for insect pests. Most insect pest problems can effectively be managed on post-flood planted soybean with little loss of yield, but scouting frequency may need to be increased if other than routine outbreaks of a specific pest occur.

Soybean Loopers

For many years, Mississippi has missed the bulk of the problems from soybean loopers by simply planting early group IV varieties early and maturing the bean crop before loopers arrived in the state. On soybean planted after June 15 (post-flood), many acres may require more than one application. Fortunately, we have several choices of insecticides that provide excellent control with long residuals for soybean loopers. Although populations are expected to be much higher on very late-planted soybeans, they can be managed effectively.

Stink Bugs

Studies at Stoneville show stink bug numbers tend to reach their highest points September 15–25 each year. Anything we do to expose soybean during this period will likely result in higher stink bug numbers. Because a large portion of the Mississippi crop is planted in early group IV soybeans, many acres will be maturing when the post-flood soybeans are still very green. This creates "green islands" across the landscape that are highly attractive to stink bugs. Plan at least two applications for late-season stink bug control. Stink bugs can be managed effectively on late-planted crops, but reinfestations will likely be common.

Velvetbean Caterpillars

Problems with velvetbean caterpillars are usually in the hills, but we do occasionally see outbreaks in extremely late-planted fields in the Delta. Velvetbean

caterpillars are very easy to control with foliar insecticides, but you must scout for them frequently.

Corn Earworms
It is difficult to predict whether or not corn earworms will be a problem in post-flood soybean since their occurrence has been sporadic most years. However, this pest does need to be monitored closely throughout the reproductive period. Consider budgeting at least one spray application for this pest.

Bean Leaf Beetles
Bean leaf beetles should be monitored closely. If treatment is required, use tank mixes or premixed products with more than one mode of action. Pyrethroids alone are not recommended in the Delta.

Insecticide Seed Treatments
Insecticide seed treatments are still a viable option to help reduce risk, even if you are trying to cut input expenses on late-planted soybean. Recent studies conducted in Starkville, Stoneville, and Verona showed a similar response of 2.7 bu/acre on soybean regardless of planting date or maturity group. Insecticide seed treatments will also help protect against early-season three-cornered alfalfa hopper damage as long as 24–28 days after planting.

Corn
Irrigated corn yield expectations for mid- to late-June plantings decline considerably (about 2 bu/a/day). They will likely be no more than 50 percent of normal plantings (110 bu/a) and can be far less. Yield expectations for dryland corn are much lower (<60 bu/a) and much more volatile than where irrigation can temper drought and heat stress.

Corn hybrid maturation is directly related to heat unit accumulation, which is represented as growing degree days with a 50 °F base level, or GDD50s. Corn hybrids adapted to Mississippi require 2,800–3,000 GDD50s to reach physiological maturity, and this requirement cannot normally be achieved planting after July 1 at Yazoo City.

Corn (and sorghum) grain moisture at physiological maturity is approximately 30 percent, which is not acceptable for long-term storage. As a result, additional time and/or artificial grain drying ability needs to be factored into practical growing season requirements for all crops. Also, field drying of corn will be very slow when temperatures cool and humidity and rainfall increase during the fall.

In summary, grain drying and general harvest conditions, particularly if we have abundant fall rainfall, will be far less desirable than normal.

Management Tips for Corn
- Resist the natural temptation to plant early-maturing corn hybrids when planting late in order to make up for lost time. Early corn hybrids are bred for much milder climates, and although they may perform well when planted early, they must endure extreme heat and humidity when planted late. This can contribute to poor performance or failure.
- Insect pests, including corn borers, armyworms, and earworms, are more likely to infest late-planted corn in high numbers and cause heavy crop damage. Hybrids containing multiple Bt traits, such as VT3Pro or Viptera, are strongly preferred. However, these specific traits require a 20 percent non-Bt refuge, which has the potential to be a catastrophic loss, given intense insect pressure.
- Southern rust will likely be a substantial threat to late-planted corn. Southern rust is an aggressive disease that traditionally infects Mississippi corn in late July. However, it doesn't normally reduce yield much because corn is nearly physiologically mature. Late-planted corn is considerably more vulnerable, particularly since the corn hybrids planted in our production system are not known to possess resistance to Southern rust. Plan to scout the crop closely and apply a fungicide if disease threatens. Since corn's reproductive growth stages span about 60 days and this is an aggressive disease, a single "automatic" fungicide application at tassel stage will likely not protect the crop. Frequent field scouting and potentially multiple fungicide applications could be necessary to moderate a heavy Southern rust infection.

Grain Sorghum
Grain sorghum is an alternative crop that may be better suited than corn for late planting because it is earlier maturing and much more heat tolerant. It is best suited for late June through mid-July plantings, particularly when grown in dryland culture.

Using earlier-maturing grain sorghum hybrids for planting after July 1 is necessary because full-season hybrids require nearly 120 days to mature. Growing earlier-maturing sorghum hybrids should be feasible, especially compared to corn, because grain sorghum is routinely evaluated for heat tolerance and is grown in environments as far south as coastal regions in Texas. Yield expectations for post-flood dryland grain sorghum are likely about 75 percent of normal, or about 60–80 bu/a. However, numerous insect problems, including chinch bugs, fall armyworms, corn earworms, and sorghum midges, can cause severe damage and will require diligent management.

Transgenic herbicide and/or insect resistant traits are not available for grain sorghum, so growers must

rely on conventional herbicide and pest management strategies. As always, use good pesticide stewardship, especially regarding sensitive crops.

Another potential pitfall with grain sorghum is that it is prone to kernel sprouting when rainy or humid weather persists during the drydown period before harvest. Thus, the ability to harvest quickly and dry grain using commercial drying equipment could be very beneficial. Planting this crop may not be advisable if drying facilities are not available.

Production expenses are about 40 percent lower for grain sorghum than for dryland corn. Therefore, for dryland fields planted after mid-June, grain sorghum offers higher potential profitability and lower risk than corn. However, marketing options are more limited, so investigate opportunities and secure an outlet before planting.

Management Tips for Grain Sorghum

- Plant about 60,000 seeds/acre. This moderate rate will limit interplant competition between plants and promote better plant health.
- Use very conservative nitrogen rates (50–80 lb N/a). Midsummer conditions should minimize nitrogen loss, and your yield goals are more moderate.
- Use herbicides before crop emergence to kill existing vegetation and provide residual weed control because few quality postemergence options exist.
- Insect pest pressure will likely be much higher than normal on post-flood planted sorghum. Plan to dedicate considerable scouting efforts to monitor insect pests, and budget more pesticide applications than normal. Potential insect problems include chinch bugs, fall armyworms, corn earworms, and sorghum midges.

Rice

Rice yields will typically decline approximately 0.5 percent a day when planting past May 1. Yield losses associated with late planting can be significantly higher, especially if temperatures are high during heading. Rice that emerges by June 20 will be ready for harvest around October 21 in the south Delta region. Rice planted after this time period may not have enough heat units to fully mature before harvest.

Management Tips for Rice

- Reduce nitrogen to a total of 150 lb N/a since high yields may not be achievable.
- Destroy all existing vegetation from prior crops ahead of planting.

Cotton

Cotton yields typically begin declining when cotton is planted after May 15 in Mississippi. Although some growers have been successful planting cotton up to June 1, the likelihood of success when planting after this date is greatly diminished. In addition to potential yield reductions, crop and pest management costs must be considered.

Cotton planted June 20 will likely not fully mature, which will result in yield losses. Production costs, including irrigation and insect management, are also likely to be higher due to the delayed planting date. Due to time required for full maturity, cost of production, and potential yield losses, planting cotton in mid-June following flooding is not recommended.

Management Tips for Cotton

If you choose to plant cotton following the recession of floodwater, consider the following in regard to crop management:

- Plant an early-maturing variety. Although the difference in relative maturity of cotton compared to some other crops is not as wide, managing for earliness is essential.
- Plant a two-gene Bt variety that also is resistant to either glyphosate or glufosinate.
- Scout for and control early-season insect pests and mites to improve early square retention and boll set. Even with Bt varieties, scout thoroughly for worms.
- Do not overfertilize with nitrogen. Do not exceed 100 lbs of actual N per acre. Consider reducing this rate to 80 lbs or less when following soybean or corn, which leave significant amounts of N in the soil. Research has shown that excess N can delay maturity.
- Be timely with plant growth regulator applications.
- Irrigation may be initiated earlier than normal due to hot, dry conditions typically encountered in June, July, and August.
- Be proactive with regard to weed management. Mississippi is home to several glyphosate-resistant weed species. Once these species emerge, management becomes extremely difficult. The use of residual chemistry is encouraged to prevent potential losses due to competition from weeds.
- Initiate defoliation when the topmost boll you realistically expect to harvest resists being cut with a knife and has seed coats beginning to turn dark. Defoliation applications should be considered when cotton is 40–60 percent open, depending on weather conditions.

Crop Insurance Considerations

Important prevented planting provisions:

- No prevented planting coverage under GRP or GRIP policies.
- Prevented planting payments equal 60 percent of the production guarantee for timely planted crops, unless a higher option was selected at signup.
- If a producer does not plant a second crop, he or she may collect all of prevented planting payment for the first crop.
- If a second crop is planted, a producer may collect 35 percent of prevented planting payment for the first crop and pays 35 percent of original premium.

Planting a second crop after losing first crop:

- A producer can plant a second crop on the same acreage, not insure it, and get all of the prevented planting payment on first crop.
- A producer can plant and insure a second crop and collect a premium equal to 35 percent of the prevented planting payment for first crop while paying 35 percent of original premium.
- If the second crop does not suffer an insurable loss, the producer can collect the remaining 65 percent of the prevented planting payment for first crop but must pay the remaining 65 percent of the original premium.

Note: These situations do not apply to double-cropping.

Producer options regarding prevented planting provisions (with examples):

1. Plant during the late-planting period, generally 25 days after final planting date.
   - For cotton and rice, the final planting date was May 25. A producer can plant cotton or rice until June 19 and still be covered.
   - For soybeans and grain sorghum, the final planting date is June 15. A producer can plant soybeans or grain sorghum until July 10 and still be covered.

Note: For most crops, the timely planted production guarantee is reduced 1 percent per day after the final planting date.

2. Plant after the late-planting period and receive an insurance guarantee equal to the prevented planting guarantee.
   - If crop is planted more than 25 days beyond the final planting date, the insurance coverage level is reduced by 40 percent (or 60 percent of the original coverage level) unless a higher prevented planting option was selected at signup.

3. Idle acreage and receive a full prevented planting payment.
   - Producer can leave field idle and receive 60 percent of the original coverage level guarantee, unless a higher level was selected at signup.

4. Plant a cover crop and receive a full prevented planting payment.
   - Same as above, with the exception that a cover crop is planted. The cover crop CANNOT be utilized until after November 1 (for most crops) and CAN NEVER be harvested. If cover crop is utilized or harvested, the payment is void and other penalties could be incurred.

5. Plant a second crop or cover crop after the late-planting period and receive a prevented planting payment equal to 35 percent of the prevented planting payment.
   - The prevented planting reduction (40 percent of original coverage level, unless a higher level was selected at signup) is reduced by another 65 percent.
   - Example: Corn crop is lost and soybeans are planted after the prevented planting period of July 10 (for soybeans). The corn insurance payment will be: original coverage level x 60% x 35%.
     If planting soybeans before the 25-day late-planting period expires, see "Planting a second crop after losing first crop" section above.

Note: These options are applicable only AFTER the final planting date.

Final Planting Dates*

Crop	Final Planting Date
Soybeans	
Following another crop	6/25/11
Not following another crop	6/15/11
Cotton	5/25/11
Corn	4/25/11
Grain Sorghum	6/15/11
Rice	5/25/11

*Applicable for Bolivar, Claiborne, Issaquena, Sharkey, Warren, Washington, and Yazoo counties for the *Yield Protection*, *Revenue Protection*, and *Revenue Protection with Harvest Price Exclusion* policies.

Reference

USDA Risk Management Agency. "Prevented Planting Insurance Provisions—Flood." Program Aid 2020. May 2011. Available from: www.rma.usda.gov/pubs/rme/ppflood.pdf

Contributors

Erick Larson, lead author
corn/grain sorghum
erickl@ext.msstate.edu
(662) 418-7802 (cell)

Tom Allen
plant pathology
tallen@ext.msstate.edu
(662) 402-9995 (cell)

Nathan Buehring
rice
nathanb@ext.msstate.edu
(662) 822-7359 (cell)

Brad Burgess
variety testing
bburgess@pss.msstate.edu
(662) 325-7784 (office)

Angus Catchot, Jr.
entomology
acatchot@ext.msstate.edu
(662) 418-8163 (cell)

Darrin Dodds
cotton
darrind@ext.msstate.edu
(662) 418-1024 (cell)

Tom Eubank
soybean agronomy
teubank@ext.msstate.edu
(662) 686-3232 (office)

Ernie Flint
area agronomic crops
ernestf@ext.msstate.edu
(662) 582-1211 (cell)

Bobby Golden
soybean/cotton agronomy
bgolden@drec.msstate.edu
(662) 686-3215 (office)

Joe Massey
herbicide residue
jmassey@pss.msstate.edu
(662) 325-4725 (office)

Corey Miller
agricultural economics
miller@agecon.msstate.edu
(662) 325-0848 (office)

Larry Oldham
soils
larryo@ext.msstate.edu
(662) 312-9250 (cell)

Bob Ratliff
agricultural communications
bobr@ext.msstate.edu
(662) 325-1714 (office)

John Michael Riley
agricultural economics
jriley@ext.msstate.edu
(662) 325-7986 (office)

MISSISSIPPI STATE UNIVERSITY
EXTENSION SERVICE
MSUcares.com

The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended.

Discrimination based upon race, color, religion, sex, national origin, age, disability, or veteran's status is a violation of federal and state law and MSU policy and will not be tolerated. Discrimination based upon sexual orientation or group affiliation is a violation of MSU policy and will not be tolerated.

Publication 2680
Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director
(POD-06-11)