extension
ALABAMA A&M & AUBURN UNIVERSITIES

Adapting Corn Production to Climate in Alabama

► Learn the risks that multiple climate scenarios impose on corn yield, as well as associated pest and diseases. Discover management strategies that can be implemented to minimize those risks.

Corn is one of Alabama's most important row crops. Alabama farmers usually harvest more than half a million acres of corn each year. Corn is grown as a part of crop rotation systems that include cotton and peanuts. Although corn is planted throughout Alabama, the majority of production is located in the northern region (Lawrence, Madison, Limestone, Jackson, Lauderdale, and Colbert Counties) providing more than 50 percent of total corn acreage. Central and southern counties such as Talladega, Baldwin, Coffee, Escambia, and Houston provide 12 percent of corn acreage.

The climate variability in Alabama is mainly linked to ENSO, which is an oscillation that occurs every 3 to 7 years between warm and cold phases of sea surface temperature in the Equatorial Pacific. The El Niño phase of ENSO results in lower winter temperatures and higher winter-spring rainfall. The La Niña phase of ENSO causes warmer and drier conditions from fall to spring. Summers are drier and hotter than normal in El Niño years in northern and southern parts, but wetter and cooler in La Niña years in northern and central parts of the state.

Here is how you can use this climate information to enhance yields and secure higher levels of profitability.

Crop yield is affected by the variability in rainfall and temperature in Alabama through the influence in plant growth and development rates and pest and disease dynamics. Climate forecasting can be a valuable tool in increasing yields and securing a more profitable crop.

Key Climate Impacts and Management Strategies

Drier/Warmer Spring	
Impact	**Strategy**
Insect Pests	
Increased population of stinkbugs	Additional scouting is needed.
Increased lesser cornstalk borer damage on corn grown on lighter soils, especially if planted late	Avoid light soils if possible. Plant early.
Increased chinch bugs, mainly on the crops with reduced tillage following grassy winter crops or weeds	Additional scouting is needed.
Diseases	
Increased risk to charcoal rot	Plant no-till or strip till corn early.
More outbreak of southern corn rust	Scout and treat as needed with a fungicide.

Wetter/Cooler Spring	
Impact	**Strategy**
Yield	
About 20% less than average yield due to more floods, less germination, less sunshine, and freeze injury	Delay planting until soil temperature reaches 55 °F.
Insect Pests	
Greater risks of true armyworms.	Increased scouting is needed.
More cutworms damaging seedlings in conservation tillage	Supplement seed treatments with a broadcast insecticide spray at planting
Fewer chinch bugs and stinkbugs	
Diseases	
More risk to seedling blight	Delay planting to promote germination and seedling growth.
Increased outbreak of southern and northern corn leaf blight and southern rust	Scout and treat as needed with a fungicide.
Nutrients	
More leaching losses of nitrogen and potassium	Split applications to increase efficiency.
Reduction in phosphate uptake	Band starter fertilizer 2 inches to the side and 2 inches below the seed.

Drier/Warmer Summer	
Impact	**Strategy**
Yield	
Low yield due to water stress and excessive heat during pollination and grain-filling	Plant corn early to avoid low rainfall and high heat periods during the summer. Apply irrigation.
Diseases	
High risk to aflatoxin contamination	Plant corn early, fertilize according to soil test recommendations, use recommended seeding rate of adapted corn variety, irrigate, and apply Afla-Guard.

Wetter/Cooler Summer	
Impact	**Strategy**
Yield	
Larger yields due to more rainfall at silking and tasseling, the critical stages of water requirement	Increase planting density and nitrogen dose to take advantage of more favorable moisture.
Insect Pests	
Fewer chinch bugs and fall armyworms	
Diseases	
Increased risk to southern rust, southern corn rust, and northern corn leaf blight.	Scout and apply fungicides as needed.

Drier/Warmer Winter	
Impact	**Strategy**
Insect Pests	
Increased survival of stink bugs and chinch bugs	Additional scouting is needed.
Nematodes	
Southern root-knot nematode may remain active for longer periods in late fall/winter, thus increasing in number and becoming active earlier in the following year	Collect a soil sample for a nematode assay from fields going into corn in fall to early winter. Treat with nematicide based on the results of nematode soil assay.

Seasonal Climate Variability Affecting Corn Production in Alabama

- The ocean-atmospheric phenomenon associated with unusually warm water forming occasionally across the eastern and central Pacific is referred to as the El Niño phase.
- The La Niña phase is characterized by cooler than average sea surface temperatures across the same region.
- The phenomenon associated with close-to-average sea surface temperature in this region is referred to as the Neutral phase.
- El Niño, La Niña, and Neutral are the three phases of ENSO, the El Niño-Southern Oscillation. In Alabama, the ENSO phenomena affect rainfall and temperature during winter, spring and summer months.
- In an El Niño phase year, the southern part of Alabama is wetter and cooler than average condition during winter, whereas the northern part is drier and warmer. In a La Niña phase year, the conditions are just opposite.
- Summers are drier and hotter than normal in El Niño years in northern and southern parts, but wetter and cooler in La Niña years in northern and central parts.
- The effect of ENSO on corn yield is more pronounced closer to the Gulf Coast (south) than in the northern parts of the state.
- El Niño produces larger yields than does La Niña in the southern part of the state, whereas La Niña results in larger yields than El Niño in the central and northern parts.
- Throughout Alabama, the Neutral phase has the largest yields of all ENSO phases.
- Corn is most susceptible to water stress at tasseling which occurs during the summer. Low precipitation especially in July, the warmest month of the year, reduces corn yield substantially. La Niña phase years have larger yields than El Niño phase years. This is mainly due to summer rainfall which tends to be higher in La Niña phase years. For the same reason, El Niño phase years have lower yields.
- High maximum temperatures during tasseling and grain filling periods also reduce corn yield substantially. Higher temperatures shorten grain filling period. La Niña phase years have larger yields than neutral or El Niño phase years because La Niña phase years tend to be cooler during summer.

Resources

AgroClimate Tools:
http://www.agroclimate.org/tools.php

Climate Risk Tool:
http://www.agroclimate.org/tools/climate-risk/

Climate Impacts:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/ENSO/composites/

ENSO overview:
http://www.cpc.ncep.noaa.gov/products/ precip/CWlink/MJO/enso.shtml

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