Second Edition - 2006

The First 40 Days™

Expert Recommendations for Best Management Practices

during the most critical period of cotton production.

This White Paper Report, Second Edition, reflects the findings of a multi-discipline, multi-state congress of research and Extension pathologists/nematologists, agronomists, entomologists, physiologists, weed scientists, economists and crop consultants. *The First Forty Days*™ workshops, conducted once in 2005 and twice in 2006, were developed around an information exchange format to encourage cross-discipline interaction. This allowed the groups to dig deeper into specific production system issues and to further refine Best Management Practice (BMPs) recommendations concerning cropping systems, inputs and practices that optimize cotton yields, fiber quality and grower profitability.

The Goal:

To bring focus to the Best Management Practices (BMPs) in the new, contemporary cotton production systems, addressing the changing pest spectrum, season-long pest management systems, overall plant health and earliness, with the ultimate goal of high yield and high quality fiber.

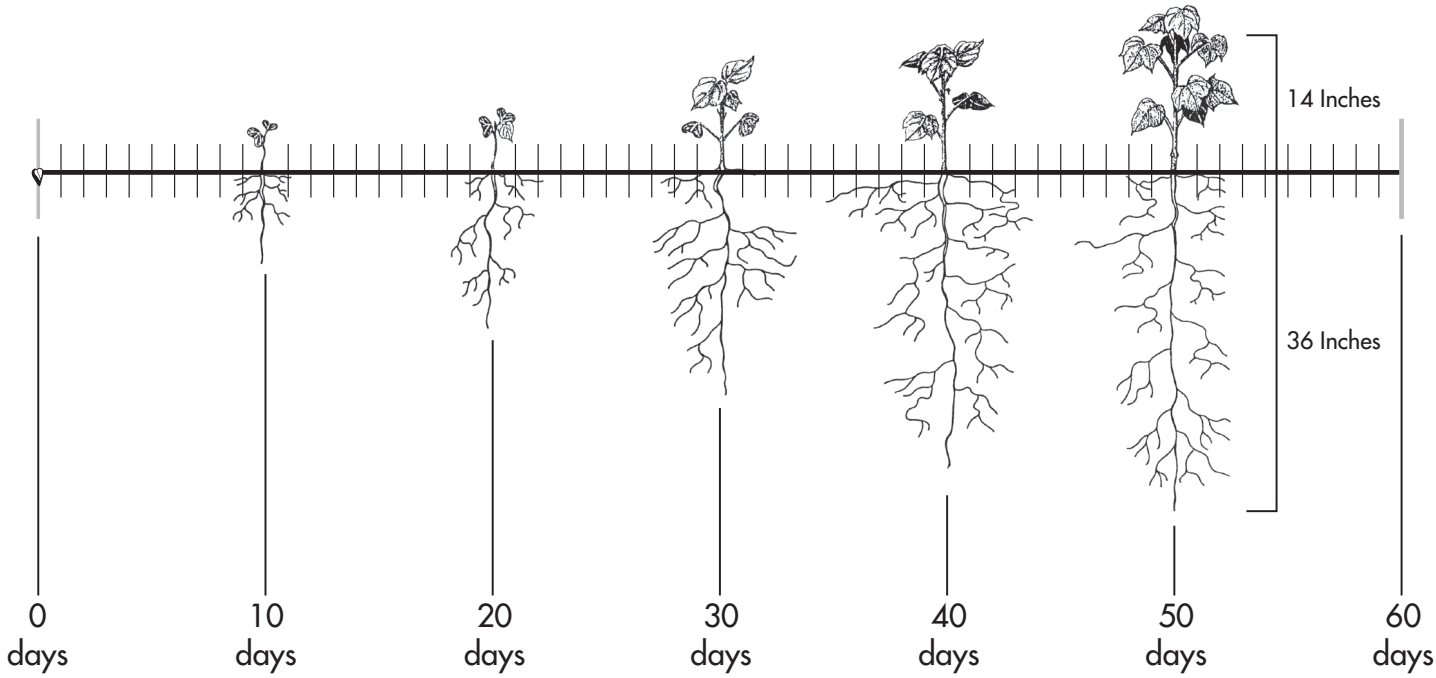
The three primary areas of discussion:

1. **The impact of at-planting decisions on optimal season-long pest management;**
2. **The shifting insect spectrum, the emergence of plant bugs (primarily Lygus spp. and fleahoppers) and spider mites as significant pests, and the importance of crop protection choices during *the first forty days*;**
3. **The impact of crop uniformity, plant health and timely development on crop management, yield and fiber quality.**

The First Forty Days after planting is the most critical stage of the cotton crop. As the biological clock is ticking, the crop's yield potential is determined during this period. As the crop moves into the midseason fruiting period, it must be healthy and uniform in order to produce optimum yield and fiber quality.

The First Forty Days™... The Most Critical Period in Cotton Production

Early Season Cotton Development



Note: Image source credit to Derrick M. Oosterhuis Ph.D. University of Arkansas

The optimum cotton crop at 40 days after planting:

• **Stress Free.** Regardless of the tillage and crop production system, the optimum cotton crop will be free of stress from insects, mites, nematodes, seedling diseases, weeds and other manageable factors, such as fertility levels and water availability.

• **Healthy Plants.** In addition to being stress-free, the optimum crop will exhibit healthy leaves, with roots extending into the row middles; and plants growing rapidly and uniformly. Earliness is important, with a height-to-node ratio of at least one (1:1) at 40 days after planting. The optimum plant will have seven to eight nodes in the early stage of squaring.

• **Uniform stand, adequate plant population.** Crop uniformity relates to optimum plant health, but its impact upon season-long crop management is significant. A uniform crop allows for a more efficient crop management system, which ranges from timing of herbicide and plant growth regulator applications through harvest aid and crop termination timing.

An adequate plant population will be at least 30,000 plants per acre and will not exceed 60,000 plants per acre. The minimum stand would have at least two plants per foot, with no intra-row gaps greater than 2 to 3 feet.

Measurement – How should the plant and crop look at 40 days?

Standardization of measurements at 40 days after planting was a critical discussion point among all workshop participants. A number of criteria were discussed, with above-ground healthy growth agreed upon as the "yardstick" for measurement.

Primary Criteria.

A plant height-to-node ratio of at least one with at least 30,000 uniform, stress-free plants per acre at 40 days after planting is the primary goal for optimizing yield, fiber quality and earliness. Supporting criteria could also incorporate plant height, canopy coverage, and plant health assessment, as well as a viable terminal and root system. At this stage the healthy plant would have two to three squares. The need for a target development curve as a measure of optimum plant growth development also was discussed.

Best Management Practices

Achieving the goal of an optimum crop 40 days after planting contributes to an efficient season-long crop management system, including weed control, plant growth regulation, pest management and fertility — even harvest aid efficiency at the end of the season. The ultimate goal is a cost-effective crop management system that delivers optimum yields and fiber quality.

Early Season Insect Control

Based upon the field/farm history and experience of the pest manager, choose an at-planting systemic insecticide with a long residual.

• Evaluate systemic inputs based upon the range of pests controlled, including nematodes and mites, as well as thrips. Ideally, the at-planting, systemic pest control input would provide control of thrips, fleahoppers and other arthropod pests throughout *the first forty days.* The increased incidence of mites in Rain Belt cotton states may be attributed to broad acceptance of seed treatments and foliar applications of broad-spectrum insecticides. Mites can be an "induced pest," due to increased early use of broad-spectrum insecticides – particularly in reduced-tillage fields. Problems with mites can be lower where an in-furrow insecticide-acaricide is used.

• Avoid convenience application programs or use caution with systems that require "automatic" oversprays for thrips and plant bug control, which can create pest problems, including cotton aphids and mites, as the season progresses. Avoid insecticides co-applied with Roundup® as a convenience; use only when insect pest control is needed. Growers are encouraged to avoid unnecessary applications; not only when thrips, fleahopper and tarnished plant bug numbers and damage ratings are below thresholds, but also because nozzles used for herbicides may not be effective in targeting insect pests. These unnecessary applications often flare secondary arthropod pests and contribute to insect resistance issues. Spray tips creating small droplets usually are best for insecticide applications.

• Eliminate host plants and breeding sites with pre-plant weed control and seedbed preparation, as well as weed management around field perimeters. An example would be the buildup of mites on pigweeds or plant bugs on horseweeds.

• Keep seedbeds free of all green plant tissue for at least three weeks prior to planting.

Recognize the residual limitations of insecticides. Scout and overspray as required, ensuring insect control through *the first forty days* – especially during periods of cool temperatures or extremely dry conditions.

• Use proper scouting techniques and treat on an as-needed basis, according to state Extension action threshold guidelines. Note that poor environmental conditions or slow management decisions also can make timely foliar applications difficult to achieve.

• The length of control of various at-planting insecticides ranges from a low of 14 days after planting with certain seed treatments up to five weeks after planting with an in-furrow granular. It is critical to protect the plant and keep it healthy through *the first forty days.*

This BMP results in:

- Economic efficiency
- Effective resistance management
- Beneficial insect preservation
- Reduced probability of flaring of secondary pests, including mites

Seed & Variety Selection

Variety selection and seed quality have a lasting effect upon the crop's early season vigor, and overall plant health and uniformity during *the first forty days*. The crop's ultimate yield and fiber quality potential at harvest begins with variety selection and seed quality. Less vigorous cultivars are more susceptible to stresses caused by inadequate moisture, cool temperatures, thrips feeding, seedling diseases, nematodes and other pests.

Choose varieties with the genetic potential for higher yield and fiber quality. Yield still is the ultimate measure for a cotton crop, although the ever-increasing demand for higher fiber quality makes this factor a close second in priority. With more than 70 percent of U.S. cotton exported, fiber quality likely will become the single most important factor for American cotton producers in the foreseeable future. International mill standards and specifications are higher and tighter than those of domestic mills.

Choose varieties with the genetic potential to produce excellent technical fiber:

- long staple length
- high strength
- premium micronaire
- high length uniformity index
- smooth leaf with a plant conformation that's efficient to harvest

Seed & Variety Selection (continued)

Because of the extended fruiting period of the cotton plant and subsequent development cycle, each boll develops under different environmental conditions than other bolls on the plant. Fibers from a single plant, single boll and even a single seed will vary in length, strength and micronaire. It's the average fiber quality within the plant that determines value. Plant genetics and environment provide the platform for higher lint yields.

Plant more than one variety; consider traits and maturity after yield and quality. Consider planting three or four varieties and determine if trait factors result in a yield drag or if the traits are coupled with poor-yielding varieties. It is highly recommended that growers evaluate more than one year of data prior to planting more than a trial acreage of a new variety.

Select the highest quality seed possible. High quality seed is critical to success in *the first forty days* and the crop's ultimate performance. Rapid germination and emergence is best because it narrows the window for seedling diseases and minimizes the impact of pests. In addition to the standard warm germination test, a cool germination test is recommended. When cool germ and warm germ numbers are added together, high quality seed will have a vigor index of at least 160 (i.e., a warm germ of 90 plus a cool germ of 70 equals 160). Early planting into cool soils requires a high vigor index. When planting early, plant the best vigor index available in the variety you are planting.

Cotton seedling vigor can be enhanced by optimum:

- Land preparation
- Seedling disease control
- Pest control
- Fertility

Seedbed Preparation— Emergence and Plant Population

Plant with precision not just speed. A consistent concern among all participants is that growers do not adequately address planting-time considerations and needs, opting instead for speed of planting as a single priority. One-half the variable costs, as well as the annual fixed costs, are spent prior to or during *the first forty days*— therefore planting with precision pays. The trend in reduced seeding rates reflects more precise planters and the producers' desire to manage high-value seed costs by reducing the number of seeds per acre. An efficient and well-timed planting operation can result in a 10 to 25 percent savings of seed cost and technology fees. The Upper South group focused on the need for strong, vigorous, uniform emergence due to cooler planting-time soils and cooler, more fluctuating ambient temperatures. The Lower South group focused on the desired plant population of a vigorous, uniform crop.

Plant 2.5 to 4 uniformly spaced seeds per foot (drilled or hill-drop pattern) with good seed-to-soil contact, warm soil temperatures and adequate soil moisture. Increase the seeding rate when planting early into cooler soils. The minimum plant population in the final stand should be about two plants per foot or about 30,000 plants per acre, with a maximum of 60,000 plants per acre. Planting less than 2 or 2.5 seeds per foot can significantly delay maturity. The goal is that soil conditions and planting depth would be optimum, ensuring vigorous and uniform emergence. Also consider matching the architecture of the plant, by variety, when adjusting planting rates. Plants with a tendency to produce more vegetative growth will perform better with lower plant populatons.

Primary Factors:

- Soil and air temperatures are optimum, according to state Extension guidelines. A soil temperature of 65° F at a depth of 4 inches for three consecutive days is optimal, although not always realistic for early planting. Although dependent upon growing conditions, a delay in planting of four weeks can equate to only a one-week delay in flowering.
- Soil moisture is optimum and seedbeds are firm for good seed-to-soil contact.
- Seed quality is good. Plant the best quality seed first, in cooler soils.
- Planting depth of 3/4 to 1-1/2 inches, depending upon adequate moisture for germination.
- Pest-free seedbed environment. Pre-plant burn-down herbicide application is made at least three weeks prior to planting to ensure no green matter is on the seedbed.
- Farmscape vegetation management. All potential host plants/weeds in and around fields are controlled to eliminate sources of insect pests.
- Adequate soil temperature for a vigorous plant.

NOTE: Replanting is discouraged, unless there is a massive loss of stand. A stand of one plant per foot would be more desirable than replanting. The University of Missouri Cooperative Extension Service has a Replanting Decision Guide.

Weed Control

Weed control at planting and at least three weeks prior to planting, is important for planting efficiency and pest control. Weed shifts and weed resistance to glyphosate are happening much more quickly than weed scientists have anticipated. Grasses, pigweed and horseweed have become more problematic. Grasses, in particular, rob expensive nitrogen from the soil.

To sustain the current weed control technology, don't rely totally on a single weed control system. The introduction of Roundup Ready® Flex will increase selection pressure for resistant weeds because the system will promote more reliance on use of glyphosate programs alone.

To sustain current technology, rotate weed control systems and use residual herbicides. It was specifically noted and discussed that the incidence of resistant weeds is increasing faster than originally thought among weed scientists, making herbicide rotation extremely important.

Recommendations:

- Stop sole reliance on the use of glyphosate;
- Where appropriate, rotate to multiple modes of action with the LibertyLink® trait technology system or conventional herbicides;
- Avoid repeated, excessive use of glyphosate;
- Use appropriate rates, as stated in the label guidelines; consider use of residual herbicides and weed populations when developing a program;
- Historical problems by field and/or areas within fields should be the focus;
- Weed spectrum may require residual herbicides;
- Size of weeds and timing of oversprays are very important when selecting a tankmix;
- Be aware of tankmix antagonism when selecting herbicide combinations.

Pigweed and horseweed were singled out as examples of the need for herbicide resistance management. One female Palmer pigweed plant produces approximately 400,000 seeds, which makes an additional 5 percent control extremely beneficial. Many weeds, such as pigweed, are host plants for mites, beet armyworms and other hard-to-control pests.

Treat weeds in a timely manner and eliminate weed competition for 6 to 9 weeks after planting. Allowing weeds to grow after this period may not reduce yield, but they can adversely affect harvest and lint quality (leaf grade and trash content).

Nematodes and Seedling Diseases

Infections by nematodes and seedling diseases during *the first forty days* are often interrelated and can be very detrimental to root development, vigor and earliness. With the potential for significant loss of yield, fiber quality and earliness at the end of the season, the need for prevention is paramount.

Nematode damage is much more costly than recognized by many growers. The rapidly expanding reniform nematode has cost the industry an estimated $839.2 million over the past five years, according to the Cotton Disease Loss Estimate Committee. Beltwide, total annual yield loss from all species of nematodes exceeds $400 million, with reniform contributing a significant percentage of that loss in the Lower South Region. Reniform can populate any soil type, making it a threat to all cotton producers. In 2005, 95.7 percent of all reported losses due to reniform nematode were in five states: Alabama, Arkansas, Georgia, Louisiana and Mississippi. Other states or areas with reniform nematode include: North Carolina, South Carolina, Florida, Tennessee, Rio Grande Valley of Texas, Brazos River Valley of Texas, High Plains of Texas.

Nematodes ...

Use soil sampling techniques and nematicides as recommended by state Extension guidelines; apply a nematicide at recommended rates and under severe nematode pressure consider rotating crops to manage nematode populations.

• Creating management zones by nematode species and by soil texture within a field is advisable. It is important to identify nematode species and densities in order to manage the problem in a cotton production system. Root knot and lance nematodes can be characterized by soil type and can be managed in zones, but reniform can not. Reniform nematode is spreading rapidly and is the most critical species to manage. It is noted that reniform nematode is not limited to a given soil type – all soils are vulnerable.

Plant resistant cultivars or rotate crops. Varieties are available that are "tolerant" to root knot nematode; but, tolerance does not exist for reniform or lance nematodes. Crop rotation is a strong consideration. Plant selected summer crops that are not nematode hosts. Peanuts would be a more favorable choice, where possible.

• Other cultural practices, such as sanitizing equipment – even your shoes – can be used to minimize the spread of nematodes and soil-borne diseases. Proper water management also can minimize the spread and impact of nematodes.

In fields or management zones of moderate to heavy nematode pressure, sidedress the recommended label rate of a granular nematicide at 21 to 28 days after planting — the pinhead-square stage. This is particularly important in continuous cotton and where the reniform nematode is present.

Seedling Diseases ...

Plant high quality seed into a firm, moist seedbed that's at least 65 degrees. The five-day forecast should indicate a warming trend. The key to minimizing the impact of seedling disease is to avoid planting into cold, wet soils, which will slow germination and grow-off, and extend the window of vulnerability to disease infections. Better seed quality and new seed fungicides have contributed to a decline in crop losses from seedling diseases over the past few years. Seedling diseases account for approximately $200 million in yield losses annually.

Apply additional, broad-spectrum fungicides to the seed or use an in-furrow fungicide on all early planted cotton or on cotton planted in cooler, wetter soils. Growers recognize lethal infections by loss of stand, but workshop participants caution that sublethal infections rob growers of yield and earliness.

Research and Development Needs

Summarizing the workshop, the group discussion focused on future needs for research and development at Land Grant universities and at USDA/ARS. Following is a summary list of those needs by category, as they were identified by the participants in 2005 and 2006:

1. The Economics of Cotton Production
- Evaluation of the economic efficiency of inputs and practices during *the first forty days*
- Profitability analysis of cropping systems

2. Insect Control
- Action thresholds are outdated and need to be updated, Beltwide and by state
- Thrips damage vs. tarnished plant bugs, specific data to refute the on-farm hypothesis that foliar-applied thrips applications provide a benefit for plant bug control
- Quantify the value, if any, of automatic applications of foliar insecticides
- Tools for "bug" management
  - New chemistry
  - Landscape ecology
  - Transgenic varieties for thrips and plant bugs
- Early season insect and mite control alternatives
- Additive thresholds of multiple (sub-threshold) pests should be established

3. Seed and Variety Selection
- Seed size and seedling vigor … define seedling vigor. Establish correlation between seed size and healthy roots and seedling vigor
- Varieties for cool conditions
- Drought tolerance
- Molecular markers in trait – screen in the lab, not in the field
- Fiber quality factors
- Resistance in seeds to nematodes and other pests

4. Agronomic Research Needs
- Vegetative growth vs. yield
- Vigor-to-yield correlation
- Update fertility levels by varieties (fertility recommendations are based on very old data)
- Nutrient requirements and management – pre-plant, at-plant, sidedress and foliar
- Heat shock proteins
- Plant compensation capabilities
- Inter-disciplinary crop management systems need to be developed, linked and packaged for growers
- Industry and academia need to partner and evaluate products and systems prior to grower introductions
- Herbicide development
- Re-evaluate weed-free competition periods

5. Diagnostic Tools
- Site specific technology
  - GPS/GIS for pest and nutrient management
  - RTK system to monitor field variability and for variable application of inputs
  - Veris/SEC to measure soil pH on-the-go for variable application of lime and other inputs
  - Nematode projections without sampling
- Rapid, reliable sampling and/or projection techniques
- Early season crop model incorporating multiple factors
  - DD 60s
  - Solar radiation
- Equipment guidance systems
- Yield monitoring and more accurate field mapping

6. Nematodes
- Nematicide for longer control or total control
- Sidedress data for aldicarb in Rain Belt cotton, and synergy of extended control of plant bugs, mites and other pests provided by the application
- Diagnostic tool for nematode presence, by species
- Site-specific application equipment for aldicarb

7. Application Accuracy and Efficacy
- Research, build data and educate the industry
- Spray tips
- Water/carrier requirements
- Pressure
- Herbicide and insecticide interaction, particularly multiple active ingredients in a tankmix

The First 40 Days™

Summary

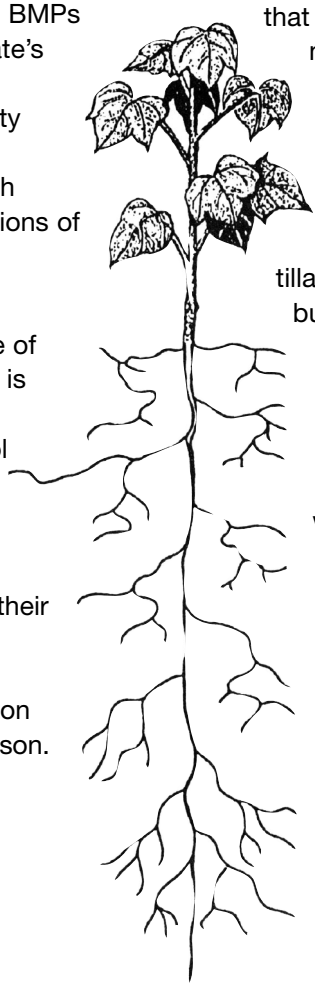
Participants in *The First Forty Days*™ Workshops feel strongly that this forum for discussion across disciplines was valuable and time well spent. Although all components of the entire crop production system are valuable, a few inputs and practices are more valuable – indeed, more critical – than others to the yield, fiber quality and profitability of the crop. These most critical inputs and practices were captured in the BMPs discussed in this white paper compendium. The general consensus of the participants is that these BMPs are adopted and promoted within each state's research program and extended through Extension specialists, consulting community and growers.

The BMPs may or may not be in line with consultant and grower actions. As discussions of various issues crystallized the BMPs, several key points were brought forth:

• Farmers are in a "sustainable ag mode of operation" — fighting for survival — which is driving their decision process concerning inputs and practices, such as weed control system, seed-applied vs. in-furrow pest control, etc.

• Planting speed and convenience have become primary decision factors, despite their value to an overall enterprise.

• Usually, the best yields result from cotton planted in the early part of the planting season.



Other issues were addressed, but were not deemed to be in the top five priority list of inputs and practices. These included:

• **Irrigation/water management.** Pre-watering is a huge issue prior to planting a cotton crop, as is proper drainage.

• **Fertility management.** Fertility is a critical issue, from pre-season planning through cutout. It was noted that new calibration curves addressing fertility are needed; because, the high-yielding varieties currently being grown draw down reserves in the soil. It also was noted that it's advantageous to the crop to supply nutrients via the soil.

• **Cropping/tillage system.** No-till, conservation tillage, ridge-till and conventional tillage all have strengths and weaknesses to consider; but the top five BMPs apply across these cropping systems. According to a follow-up survey of participants, future multi-discipline information exchange forums are encouraged, particularly for *"The Second 40 Days"* and *"The Last 40 Days."* Bayer CropScience is committed to working with the Research and Extension Community and looks forward to helping meet your needs in the future.

Acknowledgements

This report summarizes the discussion and subsequent BMP recommendations of a multi-discipline group of university researchers, Extension specialists and consultants representing the Rain Belt cotton states. Two groups for each workshop were convened to represent comparable agronomic production systems. Two workshops in 2006 expanded upon the original workshop, which was conducted in 2005. The Lower South Agronomic Zone included South Texas to South Carolina. The Upper South Agronomic Zone included West Texas to Virginia.

Sponsored by

Bayer CropScience

Second Edition - 2006

The Steering Committee for *The First Forty Days*™ Workshops:

Roger Leonard, Ph.D. — LSU AgCenter **J.R. Bradley, Ph.D. —** North Carolina State University
Gus Lorenz, Ph.D. — University of Arkansas **J.C. Banks, Ph.D. —** Oklahoma State University
Craig Bednarz, Ph.D. — Texas Tech University/Texas Agricultural Experiment Station

Special Thanks to the Moderators:

Craig Bednarz, Ph.D. — Texas Tech University/Texas Agricultural Experiment Station
J.C. Banks, Ph.D. — Oklahoma State University
Joel Faircloth, Ph.D. — Virginia Tech University **Robert Lemon, Ph.D. —** Texas A&M University

Lower South

Ralph Bagwell, Ph.D.
Extension Entomologist
LSU AgCenter

Tom Barber, Ph.D.
Extension Cotton Specialist
Mississippi State University

Craig Bednarz, Ph.D.
Plant Physiologist
Texas Tech University
Texas Agricultural
Experiment Station

Steve Brown, Ph.D.
Extension Agronomist-Cotton
University of Georgia

Gene Burris
Research Entomologist
LSU AgCenter

Roger Carter
Consultant
Agricultural Management
Services, Inc.
Louisiana

Angus Catchot, Ph.D.
Extension Entomologist
Mississippi State University

Justin Chopelas
Consultant
JWC Consulting, Inc.
Texas

Pat Colyer, Ph.D.
Plant Pathologist
LSU AgCenter

Dan Fromme
Extension Agent — IPM
Texas Cooperative Extension

Sid Hopkins
Consultant
Hopkins Ag Services
Texas

Michael Jones, Ph.D.
Extension Cotton Specialist
Clemson University

Allen Knutson, Ph.D.
Extension Entomologist
Texas A&M University

Robert Lemon, Ph.D.
Extension Cotton Specialist
Texas A&M University

Roger Leonard, Ph.D.
Research Entomologist
LSU AgCenter

Bobbie McMichael, Ph.D.
Plant Physiologist
USDA/ARS — Texas

Dale C. Monks, Ph.D.
Extension Cotton Specialist
Auburn University

Charles Overstreet, Ph.D.
Plant Pathologist/Nematologist
LSU AgCenter

Michael Patterson, Ph.D.
Agronomist
Auburn University

Dan Reynolds, Ph.D.
Plant Physiologist –
Weed Scientist
Mississippi State University

Phillip Roberts, Ph.D.
Extension Entomologist
University of Georgia

Don Shurley, Ph.D.
Extension Economist
University of Georgia

Ken Smith, Ph.D.
Plant Physiologist –
Extension Weed Specialist
University of Arkansas

Ron Smith, Ph.D.
Entomologist
Auburn University

Charles Snipes, Ph.D.
Plant Physiologist – Retired
Mississippi State University

Alexander Stewart, Ph.D.
Extension Cotton Specialist
LSU AgCenter

James Supak, Ph.D.
Extension Cotton Specialist
Retired
Texas A&M University

Charles Stichler
Extension Agronomist
Retired
Texas A&M University

Peggy Thaxton, Ph.D.
Research Agronomist –
Plant Breeder
Mississippi State University

Ray Young
Consultant
Young & Young Consultants
Louisiana

Upper South

Ron Anderson, Ph.D.
Consultant
Sandy-Lands Crop Consultants
Texas

J.C. Banks, Ph.D.
Extension Cotton Specialist
Oklahoma State University

Don Blasingame, Ph.D.
Plant Pathologist – Retired
Mississippi State University

Randy Boman, Ph.D.
Extension Cotton Specialist
Texas A&M University

J.R. Bradley, Ph.D.
Entomologist
North Carolina State University

Kelly Bryant, Ph.D.
Extension Economist
University of Arkansas

Charles Burmester
Extension Cotton Specialist
Auburn University

Stewart Duncan, Ph.D.
Extension Cotton Specialist
Kansas State University

Joel Faircloth, Ph.D.
Extension Cotton Specialist
Virginia Tech University

Barry Freeman
Extension Entomologist
Auburn University

John Gannaway, Ph.D.
Agronomist – Plant Breeder
Texas A&M University

Jeremy K. Greene, Ph.D.
Entomologist
Clemson University

Bob Griffin
Consultant
Griffin Ag-Consulting
Arkansas

Bob Hayes, Ph.D.
Plant Physiologist
University of Tennessee

Ames Herbert, Ph.D.
Entomologist
Virginia Tech University

Rob Hogan, Ph.D.
Extension Economist
University of Arkansas - NEREC

Wayne Keeling, Ph.D.
Plant Physiologist
Texas A&M University

J. Andrew Kendig, Ph.D.
Plant Physiologist –
Extension Weed Scientist
University of Missouri

Gary Lentz, Ph.D.
Entomologist – Retired
University of Tennessee

Jim Leser, Ph.D.
Extension Entomologist
Retired
Texas A&M University

Gus Lorenz, Ph.D.
Extension Entomologist
IPM Coordinator
University of Arkansas

Chris Main, Ph.D.
Extension Cotton Specialist
University of Tennessee

Steve Martin, Ph.D.
Extension Economist
Mississippi State University

Jason Norsworthy, Ph.D.
Agronomist
University of Arkansas

Megha Parajulee, Ph.D.
Entomologist
Texas A&M University

Bobby Phipps, Ph.D.
Extension Cotton Specialist
Retired
University of Missouri

William C. Robertson, Ph.D.
Manager, Cotton Agronomy,
Soils and Physiology
National Cotton Council

Scott Stewart, Ph.D.
IPM Specialist
University of Tennessee

Glenn Studebaker, Ph.D.
Entomologist
University of Arkansas

John Van Duyn, Ph.D.
Entomologist
North Carolina State University

Dale Wells
Consultant
Cotton Services Inc.
Arkansas

Jason Woodward, Ph.D.
Extension Plant Pathologist
Texas Tech University
Texas Agricultural
Experiment Station

Terry Wheeler, Ph.D.
Plant Pathologist/Nematologist
Texas A&M University

For an electronic version of this report, see www.cottonexperts.com.