REPORT OF COTTON INCORPORATED
TO THE SECRETARY’S OFFICE

Mid-Year 2020
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OVERVIEW OF CONTENTS

Each year Cotton Incorporated prepares a formal Strategic Plan* that covers the key principles that guide the Company’s long-range activities. The major priority areas over the next five years for programs at Cotton Incorporated are:

- **Growing cotton demand to 135 million bales by 2028**
  - Cotton product innovation and implementation
  - Cotton sustainability
  - Global presence for cotton

- **Growing U.S. cotton demand and production to 20 million bales by 2028**
  - U.S. cotton sustainability
  - Farm profitability – cost of production
  - Fiber quality / contamination
  - Cottonseed value
  - Cotton Management System: EFS® implementation
  - CCI contribution

In order to fulfill these priorities, specific strategic objectives are outlined for each of Cotton Incorporated’s four Operating Committees and related subdivisions:

- **Agricultural Research Committee**
  - Agricultural and Environmental Research
  - Sustainability

- **Research and Development Committee**
  - Fiber Competition: Fiber Quality Research
  - Fiber Competition: Cotton Management System (EFS®)
  - Product Development and Implementation (PDI)

- **Global Supply Chain Marketing Committee**
  - Global Supply Chain Marketing
  - Importer Support Program

- **Consumer Marketing Committee**
  - Advertising, Corporate Communications, and Brand Partnerships
  - Corporate Strategy and Program Metrics (CSPM)

Operating Committees determine tactics and activities to meet the strategic objectives identified for their program area or divisions within their program area and provide deliverables of their activity to the Board.

This bi-annual report includes the following sections:

1. **Executive Summary**: Overview of year-to-date progress report toward achieving Cotton Incorporated’s mission and strategic objectives, organized by program committee and its related divisions.

2. **Report of Activities by Program Committee and Strategic Objectives**: Detail of year-to-date progress report toward achieving Cotton Incorporated’s mission and strategic objectives, organized by Program Committee and its related divisions.

3. **Explanation of Terms and Activities**: Summary descriptions of ongoing projects and key terminology used to explain activities within each Program Committee and its divisions are included as a reference guide.

*Please refer to page 1 of the 2020 Plan & Proposed Budget Book for complete details on Cotton Incorporated’s current strategic plan.
EXECUTIVE SUMMARY

This Executive Summary section provides an overview of the report from each of Cotton Incorporated’s four operating committees and related subdivisions.

Agricultural Research Committee

Agricultural & Environmental Research (AERD)

Agricultural research at Cotton Incorporated is directed by experienced research leaders and conducted by student workers alongside experienced University and USDA-ARS scientists. This model has adapted to COVID-19 by utilizing more video conferencing instead of site visits and by asking cooperating scientists to prioritize activities that accomplish the overall mission of improving cotton production profitability while meeting the safety guidelines imposed by their institutions and local governments. Cooperators funded by Agricultural Research were able to plant their field trials as this is conducted individually and further have spent more time on data analysis, grant writing, summarization, and coordination across teams. This last activity, coordination across teams on video calls, will pay significant dividends in the future considering that traditionally researchers compete for grants to be leaders in delivering high impact science. With travel restrictions, COVID-19 has allowed more time and encouraged scientists to better communicate and coordinate with each other.

Despite the challenges facing Cotton Incorporated staff and their cooperators, the challenges facing cotton producers have been even more intense. Low commodity prices, adverse weather (drought, extreme heat, flooding), and resistant weeds make farming challenging. The realization that a year’s investment of capital and long hours will only result in a financial loss would be impossible for most people to accept – for cotton, corn, and soybean producers this is the situation growers face.

Sustainability Division

The Sustainability Division’s main objective is to continue to create an improved sustainability reputation for the cotton industry. This is accomplished by focusing efforts in five major focus areas: 1) sustainability goals and U.S. Cotton Trust Protocol, 2) microplastics and cotton biodegradation, 3) sustainability assessments, 4) sustainability non-governmental organization (NGO) engagement and leadership, and 5) cotton sustainability communications. Delivering on objectives within these five major project categories helps to lay the foundation to create a strong, trustworthy, and competitive sustainability brand for cotton across the entire supply chain.

The Sustainability Division supports industry-wide sustainability goals, the U.S. Cotton Trust Protocol, and the Cotton LEADS program with both grower engagement, participation in Field to Market®, metrics research, and technologies to reduce the environmental footprint of cotton production. The Division continues to focus on enrollment in the U.S. Cotton Trust Protocol and expand use of Field to Market’s® Fieldprint Calculator by cooperators. Field to Market® is the flagship sustainability organization, and the Division’s staff continue to serve on the Metrics Development Committee. This year the Division continues to put significant effort into grower enrollment in the U.S. Cotton Trust Protocol (USCTP) and have three active projects with enrollment elements associated. Since a key component of enrolling in the USCTP is to complete a sustainability best management practice questionnaire and a Field to Market® Fieldprint Calculator. It is anticipated that producers will help the industry meet the 10-year sustainability goals and contribute to continuous improvement on their cotton operations. In addition, there will be continued participation in organizations that support Field to Market®, such as the American Society of Agricultural and Biological Engineers and the Crop Science Society of America.

Research on microplastics and microfibers will continue across both the Sustainability and Product Development and Implementation divisions. The Sustainability Division has funded several aquatic life microfiber feeding studies that were initiated this year. This research will help determine how microfibers impact aquatic life outcomes. Engagement with non-governmental organizations (NGOs) and other microfiber research cooperators continue to implement current research results and develop further research showing the substantial impacts of synthetic microfibers. This work will ultimately lead to future incorporation of microfiber emissions and impacts into life cycle assessments and industry tools, such as the Sustainable Apparel Coalition’s Higg Index.

Sustainability efforts will be further expanded across the entire cotton supply chain. Working with the Agriculture and Environmental Research and Product Development and Implementation divisions, Sustainability will implement strategies and
directives to increase sustainable cotton production and further coordinate with the Consumer Marketing and Global Supply Chain Marketing divisions to communicate sustainability messages. The Sustainability division will increase the visibility of Cotton Incorporated as a leader in sustainability and build relationships with NGOs and influential brands, retailers, and researchers.

**Research and Development Committee**

**Fiber Competition: Fiber Quality Research**

Quality Research has 15 outside research projects for 2020, which consists of the renewal of seven projects and the initiation of eight new projects. The top priority for 2020 is dealing with contamination issues. The other key priority is the Fiber of the Future effort, which involves improving fiber length uniformity and fineness.

Product Evaluation Laboratory (PEL) activities continued to focus on regular day-to-day testing. Routine testing on two high volume instruments (HVI®) inter-lab evaluations involved four proficiency sets on each instrument. Unlike previous years, the lab did not assist with USDA-AMS calibration cotton testing because of the timing of the stay-at-home orders. A total of three proficiency tests for fabric was also run in the first half of the year. Testing services were delayed at the start of the year due to delays in the chiller installation and were put on hold during the stay-at-home period. Testing services at other times and since the partial return to office have been active for all areas of research and implementation for both Agricultural and Environmental Research and Product Development and Implementation divisions.

The Cotton Management System (CMS) Product Development team continues to support MILLNet™ software products, with the primary focus on updates and enhancements for the latest version 5.1. The MILLNet™ 5.1 software is being used for all new licensee installations. One software conversion was completed before travel restrictions were put into place, which leaves one group remaining on the older version of the software.

The CMS Technical Service and Marketing teams assisted customers 1,520 times by phone, e-mail, text, face-to-face, and the Internet. Yearly service visits were completed for licensees located in Mexico, Nicaragua, and the U.S. before travel restrictions were set. Marketing visits were made to prospective clients in Mexico and Peru and with a group based in El Salvador to consider the implementation of the system at their Honduras facility. Both the Technical Service and Marketing teams continued remote communications, technical support, and marketing messaging during stay-at-home. Two new MILLNet™ software licenses were signed, and one installation was completed in the first half of 2020.

**Product Development and Implementation (PDI)**

**Sustainability** is the top priority for PDI in 2020. Three outside research projects on biodegradation were underway in the first quarter. Outside research on available literature related to microfibers in the air was initiated and completed. The division worked with the Agricultural & Environmental Research division (AERD) and the Sustainability division to develop several fish-feeding studies related to the digestibility of cotton versus microplastics in the ocean. A study to improve the quality of cold pad batch (CPB) dyeing was initiated and completed. In the yarn and fabric areas, a recycled-fiber yarn development utilized denim shoddy to create random slub yarn. Cotton alternatives to synthetic polar fleece continued, featuring a 75% cotton-terry indigo knit. A beta test of the Material Sustainability Index (MSI) was performed with a plan to release the MSI on the Higg platform later in the year. The first four proposed work items of ISO/TC 323 on Circular Economy were approved, and ISO/TC38 on Textiles, has begun a new working group on Microplastics from textile sources. Data collection was provided for a sustainability project assessing the global plastic leakage from apparel.

The division’s assistance with the **Production Challenge** focused on contamination support with Fiber Competition (FC) and AERD. The team assisted with commercial gin testing of the new VIPR Contamination Detection system in association with USDA and major machinery manufacturers. A new opening/cleaning line and contamination detection equipment purchase was completed to offer additional in-house capability. Research into cotton alternatives to synthetic hay-bale twine continued. An initial baseline testing of the yellow module wrap was completed and analyzed.

**Innovation** is an important initiative for the PDI division in 2020 as well and it is being addressed through development and implementation. Investigation of new novel-yarn technologies continued with novel-effect ring spun yarn. Cotton nonwoven
Product Development and Implementation continued to explore **Future Market Opportunities** in the first half of 2020. The team attended various conferences and trade shows to explore Research and Development (R&D) opportunities. Research into wearable electronics continued. Development on the Cotton-to-Sugar project continued with work focused on optimizing the sugar conversion of dyed and finished garments. During the stay-at-home order, the division worked remotely to provide continuous technical assistance, sourcing support, and digital sample fulfillment while persistently developing new research ideas. In lieu of physical fabric-sample booklets, the division began work to create a digital 3D library of the FABRICAST™ collection. Staff also completed documenting work into research reports, producing new technical bulletins, and conducted literature searches into the benefit of using cotton in masks and other personal protection equipment (PPE).

### Global Supply Chain Marketing Committee

**Global Supply Chain Marketing (GSCM)**

The Global Supply Chain Marketing division is responsible for all aspects of communication and marketing to the companies and organizations in the supply chain—those responsible for manufacturing, sourcing, and marketing fiber products such as apparel, home textiles, and nonwovens products.

An important tactic for maintaining a global presence for cotton is through direct account interaction with mills, manufacturers, brands, and retailers for the apparel, nonwovens, and home products markets. GSCM staff focus their efforts on influencing major brands and retailers through coordination of various Company resources, with the goal of influencing the use of cotton versus other fibers. During the first half of 2020, GSCM staff conducted more than 275 meetings with companies in both the manufacturing supply chain and with key brand and retailer accounts.

In its seventh year, the Cotton LEADS℠ program continues to educate and inform retailers, brands, and manufacturers worldwide about responsible U.S. cotton production. Cotton Incorporated participates in this program with the National Cotton Council of America, the Cotton Foundation, Cotton Australia, and Cotton Council International. The program reached 640 partners. Two **Partner Post** newsletters went out to partners in five languages in the first half of the year.

The GSCM division is responsible for all messaging to the trade. In 2020, consistent messaging and imagery was implemented throughout, including tradeshows, tradeshows promotional items and outlets, and other publications. Over 75 different print and digital assets were created to focus on multiple messages in the most effective platforms. Messages focused on the CottonWorks™ platform as a leading resource for cotton, performance, denim, sustainability, and circularity. Publication channels included Textile Insight, WSA, EcoTextile News, Sourcing Journal, tradeshows magazines, and websites.

The Digital Supply Chain initiative in the GSCM division is an effort to enhance the division’s marketing capability by incorporating the latest and most widely used 3D textile design tools. Work in this initiative included several activities such as:
• Identifying an industry partner to facilitate the creation of digital fabric files for FABRICAST™ developments using the CLO software;

• Working with a Hong Kong-based design institute to initiate an activewear design collaboration;

• “Digitizing” an inventory of featured cotton fabrics; and

• reengineering the CottonWorks™ Website to market digital fabric files.

Many regional and global consumer brands licensed new nonwoven cotton products in the first half of 2020. Cotton containing product lines were licensed by brands in Russia, Poland, Germany, Mexico, Switzerland, Belgium, Brazil, Japan, South Korea, China, and the U.S. In the first half of 2020, there were 23 new trademark license programs: Seal of Cotton (5), cotton enhanced™ (10), and natural™ (8). The product markets include nonwoven roll goods, feminine hygiene tampons/pads/liners, wipes and skin care pads, baby diapers, filtration masks, and adult care pads.

The catastrophic events of COVID-19 in the first half of 2020 shifted fashion marketing activities. Final production and editing were done from home offices and presentations were delivered virtually.

Trademark and technology adoption programs to advance cotton usage continued in all regions of the world, with several new product introductions in the U.S., China, and Mexico.

Sixteen technical education workshops were held in the first six months of 2020 with over 530 attendees from nearly 100 major brands and retailers. Twelve of the 16 workshops were held virtually due to restrictions related to COVID-19. Four webinars were held, including The Trade Dispute & U.S. Apparel Sourcing, Stop the Leak: Addressing Plastic Leakage in Your Supply Chain, and a two-part webinar series, Cotton & Water. Stop the Leak: Addressing Plastic Leakage in Your Supply Chain discussed a new method to quantify the amount of plastic leakage from a product across the entire value chain. Over 581 individuals from more than 280 organizations registered for this event, with 369 individuals attending the live event.

**Consumer Marketing Committee**

**Advertising**

In February 2020, the Advertising department launched the Rosie Reborn campaign, celebrating denim in collaboration with The GREAT, brand designers who created a denim jumpsuit in the same look and feel of the original Rosie the Riveter jumpsuits. Campaign support included 30-second digital creative running across streaming platforms such as Hulu, Video Amp, and Tremor and social media channels. A concerted public relations effort yielded pickup across Women's Wear Daily, Rivet, Bustle, LA Times, and Forbes among others as well as a dedicated segment on the Today Show.

Your Cotton Your Way, the anthemic work for 2020, was well into production for an April 2020 launch when the COVID-19 pandemic halted production. The team quickly pivoted to speak to the current climate and produced a user-generated TV spot, Comfort in Cotton around the messaging of “Stay Home. Stay Safe. Stay Comfortable.” TV Media launched in April across networks such as FOX, ABC, CW, Roku, Bravo, E!, HGTV, and Food Channel. Additionally, network spots were secured during key prime moments like The Masked Singer, The Bachelor, and American Idol. The work was also supported across paid and organic social and additionally through YouTube pre-roll video. To further support the “Stay Comfortable” messaging during this time, Ode to Sweatpants (#sweatpantslife) was a light-hearted look at stay-at-home life during May 2020. This work ran as a social-first campaign across Facebook, Instagram, and Twitter.

The Department continued to work with existing sustainability (Know Your Clothes) and health & wellness assets while developing a robust 2020 digital customized content plan with a variety of digital platforms.

Additionally, the Department ran a total of 47 trade print ads in the first and second quarters focused on a variety of topics including: Seal of Cotton trademark adoption, denim, commodity analysis, sustainability, and textile innovation, in addition to specific ads geared toward nonwovens and the Cotton LEADS™ program.
For the first half of 2020, the Corporate Communications department estimates there have been 575 news items about the Company and its activities, representing a reach of 739.5M, and an advertising value of $1.4M. In spite of complications from the COVID-19 pandemic and other events, these figures are on par with 2019 coverage at this point in the year.

Notable among the Corporate Communications Department accomplishments were activities in support of the sustainability of U.S. cotton, the Corporate Strategy & Insights (CSI) department and its consumer and retail trends data, and consumer-facing corporate initiatives such as the Blue Jeans Go Green™ denim recycling program, as well as the Rosie Reborn advertising campaign. Expanded synopses of these activities are below.

**Brand Partnerships**

The year began with the Brand Partnerships (BP) team planning exciting new retail programs and continuing collection and distribution activities for the Blue Jeans Go Green™ denim recycling program; however by early March, the COVID-19 pandemic caused BP to react, revise, and adjust to the rapidly changing environment. While the retail industry was greatly affected by the global pandemic, the Brand Partnerships team quickly and strategically adjusted their programming, events, and retail experiences to adapt to the restructured retail landscape.

**Corporate Strategy & Insights (CSI)**

In the first half of 2020, CSI led efforts to identify opportunities and threats for cotton using market intelligence gathered through ongoing studies of U.S. consumer attitudes from the Lifestyle Monitor™ survey, assessments of cotton’s share at retail through the Retail Monitor™ research, and comprehensive global market and economic research and analysis. CSI provided over 80 information requests; participated in 25 meetings and presentations; authored 127 publications, videos, TV/radio segments, and podcasts; and worked on 10 projects.

Work completed by CSI during the first half of 2020 includes, but is not limited to: the collection and examination of data on more than 2.5MM products offered at retail in the U.S. and China; the evaluation of over 7K U.S. and 12K global consumers; the update of a comprehensive database of monthly apparel and home furnishing imports to assess sourcing patterns and tariff impacts; the management and analysis of global quantitative research in China; the management of Cotton Incorporated’s brand tracking metrics; and the delivery of consumer and economic outlook presentations. Descriptions of major projects in each area during the first half of 2020 are provided.
**Strategic Objective 1: Increase the short-term profitability of U.S. cotton production.**

**Cottonseed**
In an effort to further develop and expand the use of whole cottonseed in beef cattle feeds, a project is underway that is evaluating various levels of cottonseed in feedlot finishing rations. Previous research has been very positive and there is an opportunity to further the use of cottonseed during these times of uncertainty in the feed business and especially the fluctuations in the supply of distiller byproducts coming from the ethanol industry. Fortunately, animal research is possible due to the remote location, ease of social distancing and the need to maintain the welfare of livestock. Another similar feeding study with dairy cattle has completed the animal feeding portion of the research and the data is being analyzed.

Cottonseed oil research that is evaluating the health benefits of consuming a diet rich in cottonseed oil with both human subjects and mice has been suspended until university researchers can return to campus and continue a clinical trial with “at risk” subjects. This study is not likely to resume until 2021.

For many years Archer Daniels Midland has produced a high-protein cottonseed flour that enjoyed strong demand and a high price from the pharmaceutical industry, where it was used in antibiotic production. For that use it added considerable value to the economics of cottonseed processing. Changes in the demand for the product have resulted in the need to find additional uses and markets for this product. Preliminary aquaculture feeding studies with this product were very encouraging. Another phase of that research is underway with red drum and tuna. A positive outcome will provide a marketing opportunity for high protein cottonseed flour.

The utilization of cotton byproducts in value-added products is also the focus of a small portion of the cottonseed research budget. A product consisting of processed and fractionated cotton burs has been made and sold by a company in Texas for many years. Cotton burs have unique physical and chemical properties that allow it to be used in a wide range of products. They have been used extensively by the oil drilling industry, but the reduction of drilling has resulted in the loss of a substantial market for cotton burs. Research is underway to evaluate these products as a carrier for nutraceuticals in poultry feeds. Projects with USDA laboratories that involve mechanical removal of linters in the preparation of planting seed and a protein utilization project have mostly been put on hold.

Now that the Texas A&M Food Protein Research and Development Center has closed, their cottonseed processing pilot plant, there is no research facility in the U.S. that can bridge the gap between laboratory scale and production-sized oil mill scale. The cottonseed processing plant that was originally installed in New Mexico has been moved and reinstalled near Lubbock where it is being brought on-line, so it can be used to prepare batches of cottonseed meal for animal feeding studies. As part of this research, a commercial-scale brush delinter prototype was built and will soon be Beta tested.

**Crop Improvement**
Cotton Incorporated staff led an effort by 16 scientists and engineers to evaluate what factors led to the impressive increase in the water productivity of cotton product systems over the last 40 years. Those findings were recently published in the American Society of Agricultural and Biological Engineering *Journal of Applied Engineering*. This study has shown over the last 40 years the amount of irrigation water used by cotton in the United States has decreased while yields have increased. Factors contributing to higher water productivity and decreased irrigation water use include: 1) migration of cotton out of the far western U.S. states to the east, where more water requirements are met by rainfall, 2) improved irrigation delivery systems, 3) improved irrigation scheduling tools, 4) improved genetics and knowledge of cotton physiology, 5) and improved crop models that help evaluate new irrigation strategies, both rapidly and inexpensively. This considerable progress, along with the promise of emerging technologies, suggest that this trend will continue. The project also considered what strategies should be used to maintain the trend in increasing water productivity and those include continuing the increase in use of on-farm water storage.
Harvest and Ginning

Autonomous cotton harvest system development has continued in 2020. Cotton harvest is in a unique position to benefit from small equipment frequently removing mature bolls during the season as that should limit risk of yield and quality loss due to rainfall and extreme weather events. Development of harvester prototypes continue at the University of Georgia and Clemson University and data from hand-harvest cotton plots spread across Texas, Tennessee, and Georgia in 2018 and 2019 has been compiled and is being analyzed. Kansas State University (KSU) has also made tremendous progress on economic models to compare to our current harvest system and work on materials handling in the field is taking place at KSU as well. There are many design criteria that must be considered in developing automated systems for cotton harvest, including the number of passes to be made through the field per season, the mass of seed cotton to be transported, and number of machines needed to harvest a given area. The early part of this year was spent examining how these design criteria vary for a base scenario of a single row autonomous harvester traveling at 5 km per hour (3.1 mph), with an end of season yield of 1500 kg fiber per hectare (1,340 pounds per acre) and an average field length of 0.5 km (0.3 miles) for a farm with 800 ha of cotton (1,976 acres). For this base scenario, if harvest was all conducted in a single event as is currently done with most mechanized systems, the system would need eight single row machines each harvesting 95 bolls per second and have a storage capacity of 2 cubic meters (7 cubic feet) in order to cross the field one time over a period of 28 days. Increasing the number of harvest events per year reduces both the bolls removed per second and storage capacity requirements but increases the number of machines needed. For example, increasing to five harvest events per season over 60 days for the otherwise same base scenario would increase the number of machines needed to 17, but reduce the boll harvest rate to 19 bolls per second and storage capacity to 0.4 cubic meter (14 cubic feet) per machine. Based on the rate of bolls that must be harvested per second in all of the scenarios considered, it is likely the first commercially viable system for cotton harvest will require a number of individual “arms” with one to two degrees of freedom. Additional design criteria will be dependent on the results from the economic models.

Cotton Incorporated has been working in collaboration with the National Cotton Ginners Association (NCGA) to develop a data collection standard for cotton gins. A great deal of data is automatically measured during the ginning process. Additionally, the ability to add automated data collection on parameters such as processing rate and energy use is possible with minimal costs and modification to the gin. There are also emerging needs to share data to support sustainability, trackability, and other certification programs. Therefore, to help ginners capture the maximum value from these data and allow for efficient data sharing, a possible voluntary data standard(s) for gin data is under consideration. Preliminary objectives and data associated with the standard have been developed based on discussions between all three USDA-ARS gin labs, NC State and Texas A&M universities, the NCGA, Cotton Incorporated, and commercial gin manager representatives. To date, at least ten gins have expressed interest in participating in a 2020 pilot project to share data from their operations to determine what value is gained from the combined dataset. Two examples of what is hoped to be learned in this process are 1) a better understanding in the relationship between leaf grade, weather conditions, and variety and 2) the impact of these variables on ginning rate. If successful, staff should be able to start creating “variety specific” ginning recommendations. Varieties change quickly, and another goal will be to quantify why varieties perform differently so that a predictive model for cotton varieties can be released in the future.

Crop Improvement

Genomics and Genetics

The multi-institution team working to develop five reference tetraploid genome sequences published their efforts in Nature Genetics in April 2020. The paper was titled, Genomic diversifications of five Gossypium allopolyploid species and their impact on cotton improvement. The five species are Gossypium hirsutum, Gossypium barbadense, Gossypium mustelinum, Gossypium tomentosum, and Gossypium dawinii. Each genome is reference grade and the highest quality ever assembled and annotated. These gold standard genomes are expected to be the standard cotton researchers utilize around the world in gene editing, genetic studies, and cotton improvement for years to come. Another paper on fiber improvement was published in G3, titled, Validation of QTLs for fiber quality introgressed from Gossypium mustelinum by selective genotyping. An oral presentation was systems in more humid regions, maintaining genetic gains in cotton yields, and increased adoption of irrigation scheduling tools by growers.
made at the 2020 Plant and Animal Genome Conference, “Genome-wide variations provide insight into the genetic architecture of cotton elite lines.”

Germplasm
There was one joint germplasm release, UA212ne, made in the Journal of Plant Registrations between Cotton Incorporated and the University of Arkansas.

Plant Pathology
Target Spot Modeling Tools
Through leadership and lobbying from the National Cotton Council, a multi-state corn, wheat, and cotton foliar pathogen initiative was launched in June of 2020, just in time to allow field work and data collection this first year. Although the 2020 focus is on Target Spot, data is being collected for both Areolate Mildew and Cotton Leaf Roll Dwarf Virus to allow greater emphasis on these pathogens if they continue to threaten U.S. cotton production. The intended outcome of this five year, USDA-funded initiative is a tool that allows growers to anticipate when and where foliar pathogens (fungi and viruses) will likely threaten crops so growers can take preventative actions, such as planting tolerant varieties.

FOV4 Field Screening Project
The NIFA-funded FOV4 genetic study was advanced from the F3 to the F4 generation in the CWN. It is being advanced again to generate F5 seed that will be advanced yet again this fall to generate more genetically uniform lines to phenotype and genotype. The FOV4 field screening trial near Clint, TX, was planted on time. A team visited the site in June to collect plant leaf tissue for genotyping and early season scoring of plant response to the lethal FOV4 pathogen. While COVID-19 hampered efforts, the work was still accomplished.

FOV4 Management Projects
NIFA and Cotton Incorporated funded management studies have been initiated to understand the dynamics of the fungus in the soil and whether management practices, such as no-till, and tolerant varieties suppress the build-up of virulent races in a field. Previous work has shown that planting under favorable (warm) conditions minimizes FOV4 stand loss and that rotation out of cotton does not eliminate FOV4. However, we know little about the dynamics of the various FOV4 races in the field and how other field practices influences crop damage.

Cotton Leaf Roll Dwarf Virus Projects (CLRDV)
A substantial effort is being directed towards this aphid vectored virus in 2020 because of the widespread detection across the Cotton Belt in 2019. Efforts include screening and breeding for CLRDV tolerance, aphid management to reduce virus transmission, enhanced detection methods, and assessing the impact on cotton’s growth, physiology and yield. Since this pest primarily damages cotton after first bloom, it is too early to assess its impact in 2020.

Agronomy
Numerous research and outreach efforts are continuing in the areas of soil nutrient management and soil health to improve soil stability, soil water holding capacity, nutrient cycling, and reducing soil compaction and erosion. These efforts involve various soil health management aspects, including evaluation of reduced tillage systems, increased crop rotations, increased use of cover crops, evaluation of soil microbial composition, and other soil health parameters. Although these various forms of soil management have increased in adoption rate, there remains considerable opportunity for improvement in adoption, economic viability, and best management practices (BMPs) of these more complex cropping systems. Outreach efforts are being supported in these areas to improve long-term adoption. A new area of research includes the evaluation of living cover systems which create some challenges and opportunities with pest management and nutrient availability. However, these systems could have large sustainability benefits for suppressing weeds and reducing herbicide applications. In nutrient management, Beltwide Nitrogen Refinement studies were initiated at more than ten locations to improve nitrogen use efficiency. Similar soil testing and data collection will be performed at all locations for these trials to strengthen the impact.

In cooperation with the Extension Cotton Specialists, Cotton Incorporated continued to support the Beltwide, Large-Plot Variety Evaluation program. Ten-twelve new cultivars, of the widely grown and new cultivars, were grown with three replications in commercial fields, including planting, in-season management, and harvesting with farm equipment. These will provide unbiased and timely information to the growers to make decisions on varieties and traits. A Beltwide Seed Quality project, at 12+ locations...
was initiated, and data are currently being collected to determine the quality of seed sold and to identify seed quality characteristics important to stand establishment.

Weed Management
Reliance on a few effective herbicides, including pre-plant, at planting, postemergence, and as residual tankmix partners, has put tremendous selection pressure on a few herbicides. As a result, the Delta region has reported metolachlor and dicamba resistant Palmer amaranth. With ALS, glyphosate, and PPO herbicide resistance previously being documented, the heavy dependence on glufosinate creates tremendous selection pressure on this one product. Applied research is being conducted to evaluate BMPs for various weed species to slow the development and spread of herbicide resistant weeds. On-going research efforts include alternative practices to herbicides, weed seed bank management, and a better understanding how herbicide resistance develops at a molecular and genetic level.

The herbicide era has had many benefits, including reduced tillage and very cost-effective weed control. However, with an exponential increase in herbicide resistant weeds over the past two decades and no new modes of herbicides developed, weed management options have dwindled and simultaneously increased selection pressure on existing herbicides. Evaluation of new application technologies, which integrate GPS, image analysis, and machine learning to implement see-n-destroy technology, in addition to robotics, autonomous swarm systems, and precision placement of herbicides, will be the key to reduce herbicide use and provide alternative management options for herbicide resistant weeds. On-going research is occurring in several of these areas.

Pest Management
Southeast: Insect pests can be major yield-limiting factors in the production of cotton in the U.S. In the southeastern U.S., major insect pests of cotton include thrips (primarily tobacco thrips, Frankliniella fusca), bollworm (Helicoverpa zea), and stink bugs (multiple species). Recently, however, plant bugs (primarily tarnished plant bug, Lygus lineolaris) have increased in importance, and cotton/melon aphid (Aphis gossypii) has been implicated in vectoring a new and potentially costly viral pathogen to the crop. Members of the Southeast Row Crop Entomology Working Group (SERCEWG) involved with entomological research and Extension programming for cotton in the region will continue to work collaboratively to address these issues with a 2020 regional study.

Mid-South: In 2020, entomology research efforts in the Mid-South will focus on bollworms, thrips, and TPB management. Growers are currently able to control these pests but at a high cost. A regional study with locations in Arkansas, Louisiana, Mississippi, and Tennessee focused on mitigating insecticide resistance in thrips and reducing the number of sprays needed to control TPB and worms.

Cotton in the Mid-South is affected by a variety of insect pests that reduce yields and increase production costs. Tarnished plant bugs, thrips, and cotton bollworm are the three most important pests. The Mid-South regional project will focus on research needed to provide growers with timely information on the most effective management practices to maximize returns on investment, and to predict, respond to, and if possible, delay the development of resistance.

Southwest: In Texas, preventive insecticidal seed treatments are used over 85% of cotton acreage. Annual investment into insecticidal seed treatments accounts for greater than $50 million in Texas cotton. For thrips, as an example, seed treatments provide control for up to 2-3 weeks after planting. However, growers in the Plains region may need to put at least one additional foliar insecticide application (e.g. acephate) targeting thrips post-emergence. The major challenges growers face are the lack of preventive insecticidal seed treatments with different modes of action and the lack of research-based information on efficacy and economic profitability of different insecticidal seed treatment packages available in the market. To address this research in 2020 will focus on evaluating efficacy of foliar insecticide against thrips and determining the impact of spray tip on insecticide efficacy in cotton.

Plant bug control efficacy of cotton cultivars varies to unknown degrees and is likely affected by cotton cultivar sensitivity to plant bug damage. Some cultivars withstood pest pressure by compensating with new bolls, but there were boll maturity delays. The delay in maturity differed across the cultivars. In growing areas where earliness is desirable, the issue of plant bug-induced delay in boll maturity is very relevant to cotton production. Research in 2020 will focus on evaluating cotton cultivar sensitivity to plant bugs.
With increasing incidence of resistance in *H. zea* to Bt technologies, cotton producers have been forced to rely heavily upon supplemental insecticide applications of pyrethroids and the diamide, chlorantraniliprole, targeting *H. zea* to prevent excesses economic injury. In Texas, outside of the High Plains, *H. zea* susceptibility to pyrethroids has not been ascertained in over ten years and never for diamides. Efforts in 2020 will focus on monitoring for resistance in *H. zea* field populations to diamides and pyrethroids.

**Far West:** Few arthropod IPM systems have advanced further in their strategic use of insect control technology than cotton in Arizona. Over nearly 30 years, insecticide use has declined in dramatic terms, and cost of insect pest control has stabilized. However, with increasing interest in the source and production processes of food and fiber supply chains, growers are both challenged and potentially rewarded financially through practices of sustainability (e.g., via the Cotton Trust Protocol, the Better Cotton Initiative, etc). Future incentives for demonstrating sustainability are rigorous, requiring credible verification of the safety and sustainability of these production systems. Research in 2020 will be aimed at 1) demonstrating and verifying that the gains made in arthropod IPM are in fact linked with significant reductions in risks and hazards to human health and the environment, and 2) further reducing remaining risks to human health and the environment, including non-target arthropods needed for conserving in-field biological control agents.

**Strategic Objective 2: Increase the long-term profitability of U.S. cotton production.**

**Cotton Winter Nursery (CWN)**
The fifth Costa Rican season was harvested, ginned, delinted, and shipped in spite of the myriad issues presented by COVID-19. The local government completely closed movement and activities for five days per week, so field staff had to harvest late into the night. Three staff lived at the farm during the five-day closedown in order to gin, delint, and ship seed. All seed was received in time for planting the 2020 US spring crop.

**Strategic Objective 3: Increase number of future scientists of U.S. cotton and improve the reputation of U.S. cotton production.**

**Cotton Incorporated Fellowship (CIF) Program:**
Nine CIFs were supported during the first half of 2020, including one who started in January and one who completed his course of study in May.
SUSTAINABILITY DIVISION

Strategic Objective 1: Improved sustainability and reputation of U.S. cotton production

Sustainability Goals and U.S. Cotton Trust Protocol

U.S. Cotton Trust Protocol

The U.S. Cotton Trust Protocol will fully launch in late July 2020. The U.S. Cotton Trust Protocol team has recently completed an updated grower enrollment interface featuring a streamlined cotton-centric version of Field to Market’s® Fieldprint Calculator integrated directly within the enrollment portal. The Sustainability Division is collaborating with the Agriculture and Environmental Research Division and key National Cotton Council staff, and U.S. Cotton Trust Protocol leadership to enhance the grower questionnaire experience. The team will populate “more information” buttons associated with key questions where important sustainability and best management practice information can be distributed within the questionnaire. The team has also been executing the marketing and communications campaign designed to build awareness of the program ahead of the full program launch. Grower enrollment kits are being finalized and will be distributed to gin managers and other supply chain partners responsible for enrolling producers prior to full launch.

Agrible West Texas and Georgia Sustainability Programs

The Agrible West Texas Sustainability Program continues in 2020 but will be expanding to cover Georgia as well this year. The project aims to enroll 25 cotton growers in the U.S. Cotton Trust Protocol with 15,000 measured acres representing various geographies. Measured acres will be examined using the Fieldprint Calculator Platform to determine Field to Market’s key performance indicators (KPIs): water quality, land use, soil conservation, soil carbon, irrigation water use, greenhouse gas emissions, energy use, and biodiversity. After the growing season, results will be summarized and discussed with growers to encourage measuring, sharing, and continuously improving cotton productivity, resiliency, profitability, and sustainability.

University of Georgia and Peanut Council

The University of Georgia and Peanut Council collaborative research project continued in 2020 with the goal of exploring the environmental benefits of cotton and peanut rotations using the Fieldprint Calculator. This project will continue to enroll Georgia growers who rotate both cotton and peanuts into the Fieldprint Calculator platform to date. Results gathered during 2020 will be compared to the 2019 baseline for Georgia cotton and peanut growers. The baseline Fieldprint Calculator results will be compared to subsequent years’ data to determine relationships between production practices, economics, and sustainability. A new goal of the project this year is to gauge interest in U.S. Cotton Trust Protocol enrollment and attempt to enroll producers in this program as well.

Pheasants and Quail Forever Precision Partnership for Working Lands

Cotton Incorporated has continued the partnership with the American Society of Agronomy (ASA) and Pheasants/Quail Forever to execute the objectives of the National Fish and Wildlife Foundation (NFWF) precision conservation grant that was awarded last year. Chaz Holt, Precision Agriculture and Conservation Specialist, continues to assist landowners with farm operation return on investment (ROI) analyses using precision agriculture data and tools to promote conservation opportunities. The ROI analyses will help growers determine if it is cost effective to continue planting in unproductive regions of their fields, or if other options exist that may increase their profitability. Converting unproductive lands to conservation areas will help the U.S. cotton industry meet their sustainability goals, increase grower profitability, and promote wildlife and pollinator biodiversity in and around planted cotton acreage. A new goal of the project this year is to gauge interest in U.S. Cotton Trust Protocol enrollment and engage willing producers with the appropriate U.S. Cotton Trust Protocol staff to complete the enrollment process.

Microplastics and Cotton Biodegradation

OceanWise Microfiber Partnership

The Sustainability Division and the Product Development and Implementation Division have jointly joined the OceanWise Microfiber Partnership. The partnership is a group consisting of business and government agency partners who sponsor microfiber research in support of science-based solutions to reduce microfiber pollution in the ocean. The project started in May and will investigate three core areas: 1) microfiber shedding from fabrics and the role of textile construction, 2) time-dependent variation in microfiber pollution in wastewater treatment plants, and 3) development of an ocean particle library using a novel database of infrared spectra of natural particles and microplastics obtained by FTIR technology from coastal and open-ocean
environments. The goal of this research is to increase the understanding of fiber shedding mechanisms to help inform industry and consumer best practices, textile design, and wastewater treatment to mitigate microfiber flow to our oceans.

University of North Carolina Wilmington (UNCW) Fish Feeding Study
A microfiber fish feeding study was initiated in June with UNCW to compare the effects of synthetic and cotton microfibers on growth performance and health in black sea bass. This study will test the hypothesis that ingestion of synthetic microfibers by early juvenile black sea bass has an adverse effect on fish growth performance and health, whereas ingestion of cotton microfibers does not. The study will conduct feeding trials to determine the effects of incorporating natural and synthetic microfibers into a standard formulated diet developed at UNCW for the black sea bass. A control diet will be formulated with fish meal and other practical protein sources, including soybean meal and poultry byproduct meal for a basis of comparison. An evaluation of growth performance and body composition will be completed to determine the effects of these fibers on the health of the fish.

Texas A&M University Fish Feeding Study
A microfiber fish feeding study was initiated in June with Texas A&M university to assess the effects of synthetic and cotton fibers in the aquatic environment on red drum, shrimp, and oysters under controlled aquaculture conditions. The project will determine the fate of the fibers in water systems and various tissues and metabolites of the cultured organisms using a mass balance approach. Additionally, a histological assessment will be made examining various organs and tissues of the organisms to determine overall health impact to the species considered in the project.

Sustainability Assessments
Cottonseed Oil Life Cycle Assessment (LCA) and Allocation Study
The Sustainability Division continues its effort to complete a full (cradle-to-grave) comparative LCA to explore the potential reduction in life cycle greenhouse gas (GHG) and other environmental impacts of cottonseed oil relative to representative mixes of vegetable oils and palm oil. A full comparative International Standards Organization (ISO) LCA report was completed in May and has been reviewed by the ISO review panel. Comments are being addressed by the team. A publication will be drafted to highlight the environmental benefits of refined cottonseed oil relative to other vegetable oils in the market, identify environmental hotspots in the production process and supply chain, and identify other areas of risk. Further, using the data and insight gathered from the comparative cottonseed oil LCA, exploration has begun on how this new information might help build the case for a change in the allocation method implemented in future cotton lint LCAs. Allocation is a method of partitioning environmental impacts to the co-products in an LCA framework. Because cotton has a main product (lint) and co-products (mainly seed), the environmental burdens must be split in some way between these two products. Depending on what assumptions are made and which allocation method is implemented—ultimately determining how much of the environmental burden is placed on lint, and how much is placed on seed—the outcomes can be drastically different. In the current LCA, economic allocation is used, with 84% of the burden placed on lint and 16% on seed. Other common allocation methods used in the LCA are mass/volume, physical allocation, energetic basis, stochastic allocation, and system expansion. This study will test a variety of allocation scenarios and evaluate the sensitivity of these choices in how they impact the results to determine if a more accurate story for the life cycle impacts of cotton may be supported by changing the allocation choice.

Global Plastic Leakage Assessment for the Apparel Industry
Last year the Sustainability Division joined the Plastic Leak Project (PLP), which is a collaborative, multi-stakeholder initiative designed to identify, measure, and develop scalable solutions to close the tap on plastic leakage and pollution. The group developed the first ever Plastic Leak Project Methodological Guidelines, which fill an important gap in managing the plastic pollution crisis by enabling companies to locate and measure plastic leakage along their value chains. These insights will provide businesses with a strong foundation to define meaningful and effective strategies and actions for eliminating plastic pollution. Earlier this year, we kicked off a project with a sustainability consulting firm to utilize the Plastic Leak Project Methodological Guidelines to conduct a Global Plastic Leakage Assessment for the Apparel Industry. The project will compare the leakage from both cotton and synthetic clothing in key product categories. The project will quantify the plastic leakage intensity from each of these project categories for the global apparel industry to further highlight the issues with synthetic apparel and how it is a major contributor to the microplastic and macroplastic pollution problem.

USDA-ARS Conservation Cropping System Research at Judd Hill Foundation Farm
A conservation cropping system project was initiated early in 2020 to explore the long-term environmental and agronomic impacts of conservation practices in irrigated and non-irrigated cotton production. Studies on various conservation cropping
practices, such as minimum tillage, vegetated buffer strip, cover cropping, and non-irrigated cropping have shown to improve cotton growth and yield. Combining all these practices into one management cropping system will effectively assess the multiple benefits associated with conservation practices and affirm the recommendation of these practices in cotton production. Significant greenhouse gas (GHG) emission reduction potentials from agricultural fields may exist following improvement of crop and water management systems to maintain or increase yield. This study will provide baseline datasets in the current GHG emission levels under improved conservation management systems. This study will also provide evidence on whether cotton production is a source or sink of GHG emissions.

**Pilot to Demonstrate Implementation and Benefits of the U.S. Cotton Trust Protocol and Better Cotton Initiative (BCI)**

Demonstration field plots have been implemented at the Agricenter in Arkansas to help show similarities in both the U.S. Cotton Trust Protocol and Better Cotton Initiative fields. Additionally, more conventional approaches will be used to plant a second cotton field. In response to demand from retailers, suppliers, and interested farmer groups, programs such as BCI and the U.S. Cotton Trust Protocol have been established to increase awareness of the fact that many cotton producers are farming responsibly and striving for continuous improvement. While BCI has operated in the U.S. market for many years, it was created with a more global focus and some key differences. While both programs have similar goals in supporting farmers in addressing certain sustainability challenges and improving environmental performance, BCI fails to consider some of the key components of what is required to grow cotton in the U.S (adherence to labor laws, environmental regulations, worker protection standards, etc.). This project will help provide data to support “substantial equivalency” between the two programs and will simplify adoption of the U.S. Cotton Trust Protocol within the supply chain. This project also has a goal to help scale up awareness and adoption of the U.S. Cotton Trust Protocol. The primary objective of this project is to provide educational opportunities for extension, researchers, producers, crop consultants, and other key segments of the supply chain to better understand the U.S. Cotton Trust Protocol to increase overall adoption.

**Sustainability Non-Governmental Organization (NGO) Engagement and Leadership**

Collaborations with the textile NGO community remain strong and in April, the U.S. Cotton Trust Protocol was added to the Textile Exchange’s preferred fiber list. Sustainability has also remained actively involved in The Sustainability Consortium’s (TSC) Responsible Pest Management Task Force where efforts are being made to have the U.S. Cotton Trust Protocol best management practices questionnaire accepted as equivalent to the new Responsible Pest Management Framework TSC is developing. The Sustainability Division also actively engages on the Outdoor Industry Association’s Microfiber Research Cohort, the Sustainable Apparel Coalitions Product Environmental Footprint working group, and the ISO Circular Economy technical working group.

**Cotton Sustainability Communications**

The Sustainability Division and Corporate Communications have jointly launched a sustainability communications project with a large communications firm to educate brands, retailers, and consumers on the benefits of cotton and update the CottonToday Website. The project will focus on fundamental cotton sustainability communications to highlight how cotton is a natural fiber, specifically differentiating it from synthetics while expanding the story of microplastics and biodegradation. This project will also challenge and dispel common cotton myths by developing credible, scientifically backed editorial content which will be published on the appropriate digital platforms. The communications strategy will focus on four key elements: 1) development of a cohesive narrative and content strategy, 2) updating the CottonToday Website, 3) creating editorial content, and 4) managing communications on the fly to address misleading and incorrect reporting as it surfaces.
Strategic Objective 1: Improve quality measurements of cotton fiber, yarns, and fabrics.

Quality Research: Quality Measurements Improvement
Enhancing the Marketability of U.S. Cotton through Length Uniformity Improvement

2020 Objectives: Identify salient features of the fibrogram, which can be useful to isolate pertinent fiber length distribution traits. Once identified, check for repeatability, stability, and reproducibility. Perform calibration of the salient features within the fibrogram, followed by sharing the protocol with fiber labs across the U.S.

A mix of 1,500 samples has been obtained for this undertaking in 2020. In the first quarter of 2020, 380 samples were tested with ten replications of the fibrogram on three High Volume Instruments (HVI®), and 139 samples were tested on an Advanced Fiber Information System (AFIS®). In previous years it was shown that the fibrogram length curve from the HVI® contains information about within-sample variation in fiber length that is currently unused. This information appears to be capable of explaining as much information about the variation in yarn quality as information captured by the AFIS® length distribution. All three HVI® are being used for fibrogram retrieval. Initial evaluation of the fibrograms across the three HVI® reveals that most of the differences among HVI® are concentrated in the middle portion of the fibrograms (between 10% and 70% span length). The result observed so far revealed that the unused part of the fibrograms is different from HVI® to HVI®. This is not surprising because this part of the fibrogram is not calibrated. As expected, the regular HVI® outputs (calibrated) do not show differences among HVI® except in rare cases, probably due to the natural within-sample variation. Therefore, the whole fibrogram needs to be calibrated for this data to be used for research. The calibration protocol previously developed was challenging to validate with higher complexities with implementation in testing labs. Therefore, an alternate approach to attempt identification of salient features of the fibrogram followed by calibration of those features is being investigated. The development of a method for automated retrieval of the fibrogram is underway. Due to stay-at-home orders, there was no testing on this project from mid-April to early June. As of mid-June, this group is in Phase 3 of reopening, leading to progress being made in fiber and yarn testing.

Maturity and Standard Fineness: Determination, Calibration, and Use
2020 Objectives: Survey commercial cotton crop to provide recommendations to cotton breeders. Identify commercial candidate bales for calibration cotton production and determine the variability of the standard fineness within varieties of cotton commercially produced in the High Plains of Texas. The goal of this project is to develop reference material for maturity and standard fineness based on fiber cross-section analysis.

Nine levels of maturity and fineness combinations are required for this project, out of which six cottons have been identified. These bales have been blended per International Cotton Calibration Standard Committee (ICCSC) calibration material protocols. Three of the blended bales have been fully tested to provide cross-sectional reference values. Each bale has 60 samples pulled for fiber cross-sections. Work on a fourth bale was started with 20 cross-section samples completed in the first quarter of 2020. Two additional bales of the needed nine have been acquired but have not yet been blended. Due to stay-at-home orders, there was no testing on this project from mid-April to early June. As of mid-June, this group is in Phase 3 of reopening, leading to progress being made in testing.

Finding Ginning Methods That Improve Fiber Length Uniformity
2020 Objectives: To develop, test, and report on ginning methods that improve fiber length uniformity index.

Into the third year of this project, results indicated significant differences in the length uniformity from using the experimental lint cleaner connected directly to the gin stand, thereby eliminating the feed mechanism. Roller ginning prevailed; however, when comparing only the saw ginning treatments, the saw gin coupled lint cleaner had longer fiber, better length uniformity, fewer neps, and less lint trash than the saw gin with a conventional lint cleaner. Data entry, analysis, and manuscript writing was completed and submitted for review. The manuscript is entitled “Evaluation of Alternative-Design Cotton Gin Lint Cleaning Machines on Fiber Length Uniformity Index” and will be published in the AgriEngineering journal. Work began on the spinning trials on lint from the gin tests, which are being conducted at the USDA-ARS Southern Regional Research Center.
Determining Fiber Properties from Full- and Model-Sized Saw and Roller Gin Stands

2020 Objectives: To evaluate the differences in fiber properties, lint percent, and lint turnouts when processed with table-top versus full-size gins spanning a set of nine gin treatments.

The principal objective of this project is to evaluate the effects of gin treatments on fiber properties tested with HVI® and AFIS®. This project is in its second year and employs machine and hand-picked cotton with varying fiber traits, especially uniformity and fineness. Therefore, a barbadense type (Pima) and two Upland varieties were utilized here. Refurbishment of the full-size reciprocating knife gin stand needed for this study has been completed. The refurbishment of the feeder for the gin stand has been started with the installation of electrical switchgear on the reciprocating knife roller gin stand and feeder. The refurbished roller gin reclaimer was installed in the roller ginning lab. Progress is stalled because of stay-at-home orders, but tests are planned to resume when reopening happens, which may begin for this group by the end of June. The electrical work will need to be completed, the reclamer installed, and the gin will need to be broken in before testing can begin.

Dual-beard Fibrography for Cotton Length Distribution Measurement

2020 Objectives: The objective of this project is to develop a portable, economical, and easy-to-use system for fiber length distribution measurement based on dual-beard fibrography and an iterative separation principle.

The project objective is to develop a portable, economical, and easy-to-use system for fiber length distribution measurement based on dual-beard fibrography and an iterative fiber separation algorithm. The goals specific to the current year are to improve testing by eliminating the need for fiber alignment/entanglement, allowing the beard to be scanned entirely to include short fiber content enabling comprehensive measurements on fiber length distributions, length uniformity, and other major fiber parameters. In the validation and comparative data testing against HVI® and AFIS® data, the researchers compared 29 samples with the dual-beard technology. These samples had a length uniformity range of 78-86%. Correlations showed a positive relationship between the machines.

Cotton Contamination Detection at Gin Stand Feeder Apron

2020 Objectives: Assess the best method for detecting and removing plastic contamination at the gin-stand feeder apron.

A commercial version of this detection system is now available, while researchers continue to add sophisticated upgrades to the Visual Imaging Plastic Removal (VIPR™) system. To help lower the hurdle to industry adoption, researchers ported the software from Linux® to run under Windows®. For module camera systems, a white paper and a peer-reviewed publication was published, which provides a blueprint for how to build a simplified version of the module feeder inspection system. This provides a system where ginners can look at a monitor periodically when the module feeder is stopped to view rollers for contamination. The publication is titled “A Cotton Module Feeder Plastic Contamination Inspection System” (published in the AgriEngineering journal.) Research improvements for the next generation of module camera systems entail finalizing the software that automates the recognition of the plastic on the feeder rollers. Because the research at this stage is mostly programming and image analysis work, there have been few delays in progress as work was continued during stay-at-home.

Exploring Methods to Extract Plastic Contamination from Cotton (GoldenLion)

2020 Objectives: Evaluate the plastic removal ability of a Chinese manufactured system that was developed to remove various foreign matter from seed cotton, including plastic sheets and strings. Investigate other methods to effectively remove plastic contamination from the cotton flow at the gin.

Based on the tests done in 2019, the first quarter of 2020 involved plans to address the GoldenLion system with modifications to optimize the plastic contamination removal system. Researchers designed, built, and installed a new hopper, which doubled the amount of seed cotton going into the system, therefore, doubling the test run time. The new hopper also has a lid to prevent airflow from bypassing the proper air inlet. Comparative testing will be done across the GoldenLion, stick machine, and cylinder cleaner. Three types of plastics will be tested 1) thicker/stiffer heavier round module wrap (RMW), 2) thinner/pliable lighter RMW, 3) plastic grocery bags all at various sizes (2x2", 4x12", 6x72", and whole bags). The test will involve three airflow rates (10,000, 15,000, and 20,000 cubic feet per minute (the highest corresponding to the highest air flow recommended by the manufacturer)). Seed cotton to be tested will be raw and directly from the module and then also seed cotton that has been opened and previously processed through one seed cotton cleaning machine. Progress is stalled because of stay-at-home orders, but tests are planned to resume when reopening happens, which may begin for this group by the end of June.
Establish the Suitability of U.S. Cotton for Vortex Spinning

2020 Objectives: This project was initiated in 2020 with the predominant goal of determining the impact of fiber properties on vortex yarn quality (MVS). A special emphasis will be put on fiber length, length distribution parameters, and tensile properties as limited results from previous work have indicated the importance of these qualities for vortex yarn.

The advent of faster and modern spinning systems such as ring and vortex has led to the demand for higher quality U.S. cottons as compared to quality requirements for open end spinning. Currently, most MVS spinners prefer to use cotton blends with polyester or other fibers to produce high-quality yarns. This research project was initiated to utilize higher quality cottons from the current commercial bales and high-quality cottons from cotton breeders to generate data to be able to make recommendations to spinners for generating 100% cotton yarns using MVS technology. In the first quarter, the research team was able to procure 20 bales comprising of an array of fiber properties from a few U.S. growing regions. HVI® tests were done on these bales to verify classing office fiber properties. Seed cotton from other labs with exceptional fiber strengths and lengths was procured and ginned. Due to stay-at-home orders, there was no testing on this project from mid-April to early June. As of mid-June, this group is in Phase 3 of reopening, leading to progress being made in yarn spinning and testing.

Measurements for Improved Cotton Quality

2020 Objectives: The objectives of this project involve the development of a robotic system to acquire fiber quality information at the gin, and to determine the relationship between seed strength and seed coat fragments.

Before the start of this new project, a robotic arm was developed and set up to acquire fiber quality measurements in a commercial cotton gin. There were three sensors on the arm to determine the color (colorimeter), micronaire (Near Infrared NIR), and leaf grade (camera) information. The NIR and colorimeter were removed because of a lack of stable results. The stationary camera has been replaced with an improved digital camera system to mimic the HVI® color head. The mount and set up in the prototype allow for a 3-inch x 3-inch image to be collected without glare. This system will capture digital images of the sides of bales during the ginning season. These images will be processed using a python program (under development) to report the color grade and leaf grade from the collected image and will be compared to the AMS HVI® data for those bales. Images obtained in previous seasons using the original camera system, as well as AMS samples, are being used to develop the software system.

For the seed coat research, samples from the 2019 National Cotton Variety Test are being collected. These seed samples are being tested for seed strength on an Instron Universal Testing Machine after extended conditioning at standard atmospheric conditions per ASTM D1776 to allow the seed moisture to equilibrate. The lint samples from these cottons are being tested on AFIS®, and seed coat nep counts will be analyzed for relationships to the initial seed strength results.

This group is still under stay-at-home orders and is unlikely to return to the labs until late July.

Targeting Fiber Quality Attributes for the Fiber of the Future

2020 Objectives: Identifying novel fiber quality breeding targets using the yarn and fiber quality database previously created, investigating a potential tool employing holographic principles for high-speed fineness and maturity measurement, and determining length distribution attributes using micro-ginning.

This is a new project initiated in 2020 to mine data from previously created datasets from commercial U.S. cotton bales and identify/explore the potential for breeding traits that may lead to length uniformity and fineness improvement. Progress on holographic methods is ongoing in the partner lab, where 14 samples have been sent for testing from the 104 reference cottons. The researchers have collected over 60+ holographic images spanning three diverse samples from the reference cottons. The first step in this research is to check the granularity of the detection system. Samples from the micro-gin trial have been ginned. Due to stay-at-home orders, there was no testing on this project from mid-April to early June. As of mid-June, this group is in Phase 3 of reopening, leading to progress being made in fiber testing.

Genetic Effects of Exotic Genes on Fiber Quality in Upland Cotton

2020 Objectives: The objective of this proposal is to elucidate the genes conferring fiber length and fineness, respectively. Fiber resilience to withstand fiber processing will also be tested to decipher any potential genetic abilities from improving fineness and length as a complex.
This is a new project initiated in 2020 to address the potential of improving fiber fineness biologically by testing Gossypium barbadense chromatin on Chromosome 25 harboring the fiber length quality loci trait (QTL) and micronaire QTL. The research goal is to explain the genes conferring fiber length, length uniformity, and fineness. Researchers will also simultaneously look at the resilience of fibers to withstand fiber processing at the microgin conferring to genetic, environmental, and mechanical effects. The researchers have worked on greenhouse plants to obtain seed, which will be planted late-season this year owing to stay-at-home orders.

Genetic Dissection of Fiber Traits in a Subset of the Exotic Cotton Nested Association Mapping (NAM) Populations

2020 Objectives: The objective of this study is to identify QTLs associated with critical fiber traits and utilize AFIS® to attempt separating complexities from HVI® micronaire and length uniformity measures.

This is a new project initiated in 2020 with the long-term goal of realizing high-throughput phenotyping in plant breeding using AFIS® traits. For decades, AFIS® has documented immense value in improving fiber quality and understanding spinning constraints; however, it is nearly impossible to screen fiber quality using AFIS® when developing new varieties. Owing to the time consumed and, consequently, the expense involved with AFIS® testing, this project aims to decipher markers associated with valuable traits from AFIS®, which could be camouflaged from HVI® data.

With past support from the National Science Foundation and Cotton Incorporated, researchers invested ~$1.5 million in the development of 27 NAM populations (of >100 individuals each) involving crosses between multiple representatives of each of the wild/feral botanical races of Gossypium hirsutum (Upland cotton), and widely used breeding lines DES 56 and or Acala Maxxa. Single plant plots from most of the lines grown in 2019 were hand-harvested, and fiber is being ginned for testing. Activities on seed preparation stalled from stay-at-home orders, which led to postponing large field trials to 2021. However, genetic mapping of the three target populations has been performed, and data analysis continued during the stay-at-home period.

Research and Fiber Quality Meetings

Staff participated in a variety of meetings including Cotton Beltwide Conference; hosted researchers from Australia, USDA New Orleans, and USDA Lubbock for discussions about future project collaborations; Joint Cotton Industry Bale Packaging Meeting; conference call for the Permanent Bale Identification (PBI) Tag Subcommittee; conference call on RMW specification testing; and a conference call on cotton bale bagging.

Strategic Objective 2: Provide accurate test data to support research and marketing efforts.

Product Evaluation Laboratory

The Product Evaluation Lab (PEL) acquired a new High Volume Instrument (HVI®) in January for measuring cotton fiber properties, including length, uniformity, micronaire, strength, color, etc. With this new purchase, the lab was able to retire the refurbished HVI® and keep the 2006 model HVI® and the new model running in the lab concurrently. The PEL also added one Universal Wear Tester (UWT) in May. A UWT is an instrument that tests the flex abrasion and durability of fabrics and is used for testing TOUGH COTTON™ technology and PUREPRESS™ technology. A second UWT is on backorder with anticipated delivery by the end of August. The lab was also able to get Windows® updated on the 2006 model HVI®, as well as the lab's AFIS® Pro 2.

Agricultural and Environmental Research

Testing for Agricultural and Environmental Research (AER) was focused on general Agricultural Research Initiatives and Variety Improvement. Work continued on single versus multiple-pass harvesting, robotics, target spot, nematode, gene combinations for cotton improvement, and fiber length uniformity improvement by ginning methods.

Fiber Competition

The Standards reference covers a variety of proficiency and calibration practices as follows: For fiber testing, the following routine HVI® studies were completed on each of the two HVI® during the first half of the year: three monthly check cotton tests, and one Commercial Standardization of Instrument Testing of Cotton (CSITC) round robins. No Bremen Institute round robins were performed due to samples not being permitted to ship to the U.S. from Germany. And no USDA-AMS 220 Calibration Sets due to mechanical issues followed by stay-at-home timing. For fabric testing, one AATCC and two ASTM proficiency studies were completed. For yarn testing, the TestTex yarn proficiency study was missed due to stay-at-home orders.
Under the Agricultural Research reference, a collaborative project looking at maximizing cottonseed oil while maintaining fiber quality continued to be evaluated. For Technical Services, the lab assisted a textile company with AFIS® testing until their unit was repaired.

PEL continued work to create standard specifications for the RMW. This has been a cross-division effort between PEL, AER, and Textile Chemistry Research.

Global Supply Chain Marketing
Technology Marketing (TM) submitted research projects for 100% cotton ‘knit denim’ NATURAL STRETCH™ fabric and a lightweight blister fabric from a garment manufacturer for physical testing.

Product Development and Implementation
Highlights of work are listed by department:

- Fiber Processing (FP): Research efforts involved typical support work for bale checks, recycled fiber research, effects of open end rotor profiles and diameters on yarn characteristics, comparisons of new weighting arms for yarn, yarn for evaluating new knitting equipment, 30s ring spun compact ‘S’ twist for skew control, testing irregular bobbins from a compact ring-spinning frame to diagnose the issue; and Technical Service for causes of barré and working with a brand on ‘breathable’ bottom weights.

- Product Development (PD): Testing consisted of samples for the FABRICAST™ line, which were tested for basic fabric properties. If the samples contained a technology, the performance of that technology was also evaluated. Research covered efforts such as testing bale twine for baseline characteristics, air permeability on weave structures and laminate fabrics, and general fabric performance testing; Technical Service was done for a denim company on NATURAL STRETCH™ fabric and colorfastness for natural dye yarn packages.

- Technology Implementation (TI): Testing services (often involving multiple trials for many different groups) were provided in support of the implementation of all Cotton Incorporated technologies.

- Technical Services (TS): Testing services (often involving multiple trials for many different groups) were provided in support of the implementation of all Cotton Incorporated technologies. Technical Service projects included evaluations of moisture management, barré, stretch and recovery, and dimensional stability for various customers. Abrasion trials were performed to differentiate the effectiveness of finishes for a brand supplier.

- Textile Chemistry Research (TCR): Research efforts included continued work on newness retention, soil release finishes (cleanCOTTON), moisture management work including phase change material, TransDRY®, WICKING WINDOWS™, STORM™, TOUGH COTTON™, and PUREPRESS™ technologies. Work was performed on endure™ and dual functionality technologies for the FABRICAST™ line. Implementation support and Technical Service continued to focus on PUREPRESS™ technology efforts.
PEL Testing Summary for 2020 as of June 30:

### Cotton Incorporated Activity Summary Report

Date Range: 01/01/20 - 06/30/20  
Completed Projects

<table>
<thead>
<tr>
<th>Department</th>
<th>Reference</th>
<th>Fabric (Projects/Samples/Tests)</th>
<th>Fiber (Projects/Samples)</th>
<th>Yarn (Projects/Samples/Packages)</th>
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Strategic Objective 3: Develop and maintain software tools to buy, sell, move, and use cotton with improved efficiency and profitability.

Software Development and Maintenance

Updated Software

MILLNet™ software was modified to add the suggested electronic warehouse receipt (EWR) bale tie codes for electronic data interchange (EDI) import/export and database reporting purposes. Additional programming updates for the MILLNet™ software primarily based on customer requests have been completed, as well as an initial exploration of handheld color measurement systems. The staff has started evaluating how handheld color systems read color versus HVI® color readings. The staff has also started assessing those systems' abilities to transmit data. This effort is a precursor to the potential of on-site color readings that can be imported into the MILLNet™ software. Staff also completed a file conversion to include support for U.S. mills that require contracts priced using the Commodity Credit Corporation (CCC) loan table to include the new plastic extraneous matter discounts. For USCROP™, staff updated the CCC Loan tables to include the 2020 table.

Android™ Handhelds

The beta version of the Android™ handheld barcode readers that link to MILLNet™ was turned over to the Technical Service team for testing. As bugs and issues were reported back, programming updates were made. The teams are working towards offering the Android™ handheld option in the next MILLNet™ release.

Software Service and Marketing

Updated Trax® Software

Staff coordinated with the vendor for new updates to the TRAX customer database. The updates include reports of licensees by country showing hasp expiration dates, lease dates, and the number of facilities with software.

MILLNet™ Software Conversions

The goal for the retirement of the previous version of MILLNet™ is December 2020. Staff was able to complete conversions for all licensees except for two as of the end of 2019. In the first quarter of 2020, the software conversion was completed for one group in Mexico. This leaves only a group in China remaining on the old version, which will be converted when travel restrictions have ended.

New Licensees

Two new MILLNet™ software licensees were added in the first quarter this year. One is the addition of the Nicaragua facility for an existing global licensee that processes 100,000 U.S. bales per year (Nicaragua site only). The team was able to complete installation and training before stay-at-home orders occurred. The second new licensee is located in Korea and processes 55,000 bales each year. The installation and training for this group have not occurred due to the stay-at-home order and travel restrictions. Installation prep work has been completed, including a remote set-up of Sato desktop printer, a Zebra portable printer, and a handheld. Full installation and training will resume when travel restrictions have ended.

Technical Service Efforts

On-site technical service visits to provide yearly routine services were done in Mexico, Nicaragua, and the U.S. before travel restrictions were set. Remotely, the team has provided additional MILLNet™ training for new staff at one facility in Peru, and one in Vietnam. The team supported several clients in setting up remote options for accessing MILLNet™ during stay-at-home orders in numerous locations. Technical support was provided for a data crash at one site in China and a more significant issue with data at another group in Peru. The team responded to general support requests from clients that were still operating in the office as well as remote offices.

With the programming for Android™ handhelds complete for beta testing, the technical service team initiated quality assurance testing for the system, entering the cycle of test, program update requests/bug fix, retest. The new MILLNet™ program updates based on customer service requests have also undergone quality assurance testing before the planned release. The team also completed the second round of complete MILLNet™ testing and submitted change requests to development. The overall functionality of MILLNet™ is solid, and most of these requests consisted of user interface and user experience changes to increase the usability and consistency of the program.
The teams also completed the development of a customer contact sheet and gathered data for MILLNet™ customer statistics from 1985 to 2020.

Marketing Efforts
In the first quarter, staff visited with potential clients in Mexico and Peru and with an existing client in El Salvador seeking possible expansion of EFS® into their newer Honduras facility. Once travel restrictions were in place, staff continued communications with target clients including two groups in Indonesia, one long-term target in Mexico, one long-term target in Peru, one existing client with a new acquisition in Turkey, a new target in Vietnam, and discussions with a representative for a group in Bangladesh. The team aided in providing technical service for the target group in Peru on a barré challenge and to build-up their confidence in Cotton Incorporated as a future partner.

The package of software products currently being marketed include:

- EFS® System MILLNet™ 5.1.007 software
- EFS® System MILLNet™ for Merchants 9.0 software
- EFS®-USCROP™ 8.6 software
- Cotton Communicator™ 1.025 software
Strategic Objective 1 Concentrate efforts on broadly defined key market categories where cotton has suffered significant market share erosion. Identify and research sustainable innovations in technology and product development that can recover, grow, and preserve cotton market share.

Package Preparation for Functional Finish Research
Since January 2020, Fiber Processing (FP) staff have performed package preparations on one project for 48 pounds of yarn in support of Cotton Incorporated TOUGHCOTTON™ technology. Four additional projects, collectively totaling 371 pounds, were performed on a mixture of doubling, twisting, and backwinding of yarns for Product Development (PD) projects.

FABRICAST™ Information System – Textile Collections for Marketing Toolkits
The PD team completed a FABRICAST™ collection for apparel and home fabrics in the first quarter, updating and augmenting the marketing toolkits utilized by Global Supply Chain Marketing (GSCM) in their interactions with brands and retailers. The new FABRICAST™ collection of apparel and home fabrics encompasses performance cottons via construction, blends, and finishes for shirting, outdoor activewear, athleisure wear, bottom weights, and denim. Virtual presentations were uploaded to the corporate Cotton Incorporated and CottonWorks™ Websites for continued engagement with the industry. Main categories for the 2020-1 collection follows.

- **Functional Performance Knits** - TransDRY® technology is the performance moisture management process that allows cotton fabrics to wick and spread perspiration. Since TransDRY® technology starts at the yarn phase, the possibilities to engineer moisture management fabrics are endless. STORM COTTON™ technology provides water resistance and reduces the absorbent capacity for jersey and French terry developments. Feed stripes of cotton and synthetic yarn allow for contrast dyeing and visual interest. STORM COTTON™ technology provides antimicrobial properties plus water resistance. Novelty yarns in a heavier weight French terry have a more athleisure feel.

- **Performance Cotton | Dual Technologies** – To create additional levels of performance, this knit collection includes combination technologies of WICKING WINDOWS™ + TOUGH COTTON™, TransDRY® + TOUGH COTTON™ (moisture management and improved abrasion/durability), WICKING WINDOWS™ + PCM Technology, and Sweat Hiding™ + WICKING WINDOWS™ + PCM Technology (moisture management and phase change material). In continuation, projects with technology combinations were applied to cotton woven fabrics, producing additional levels of performance. The woven collection includes combination technologies of TransDRY® + TOUGH COTTON™ (moisture management and improved abrasion/durability) and TransDRY® + PUREPRESS™ (moisture management and wrinkle resistance). Some of the fabrics were printed for enhanced visual interest.

- **Athleisure Flat Knits** - Adding stretch to cotton provides all the benefits that are inherent to cotton and pushes it to the forefront of the ever-increasing athleisure market. Flat knitting technology allows various structures to be body mapped around the garment giving a sporty look and feel to the fabric. To achieve the looks, cotton novelty yarns with a techy feel were integrated with textural stitch combinations in engineered placed patterns.

- **Inlay Technique For Cotton-Rich Synthetic Fleece Alternative** - Inlaying yarn into a flat knit machine allows a heavier yarn to be tucked into a lighter weight ground knit stitch. This provides the ability to use a wider size range of yarns without having an extremely heavy finished fabric. The inlay technique can also give a woven, tweed, or terry appearance to the knit fabric.

- **Woven Lightweight Performance Blend | Cotton & Wool** - This blend combines the performance of wool with the softness of cotton. Two plaids and a herringbone are in this collection of new flannels that have been mechanically brushed, or peached, on both sides for extra softness. No additional finishes were used.

- **Textured Dobby | Garment Finishing Effects** - This addition to a previous line of texture dobies employs floats in the weave structure and contraction in finishing to create a heavily textured fabric. Shadow dye garment finishing effects were used to enhance the visual depth of the weave structures.

- **Denim Embellishment | Embroidery** - This fabric combines technology from the Fiber Processing Lab (FPL), the Product Development Lab (PDL), and the Garment Processing/Printing Lab. Fiber processing’s new AGTEKS yarn twister was used to create a 3-end blue and white yarn with regions of over-twist. Product Development’s new ZSK embroidery
machine was used to cord the yarn onto denim. The fabric was then washed down using the Tonello NoStone® garment finishing technology.

- **Texture + Warmth | Bedford Cords** - These 100% cotton bottom-weight fabrics are an alternative to traditional twills and corduroys. The vertical cords in the fabric create visual and physical texture. The higher surface areas of the raised stripes were sueded to add a soft hand, like a corduroy. STORM COTTON™ technology was applied to the fabric to add water resistance properties which would make this a great choice for the outdoor market. This fabric would also be an appropriate option in the home market for light duty upholstery or top of the bed.

- **Texture + Warmth | Moleskin** - A 100% cotton moleskin-base fabric was laser marked in an allover topographic pattern and finished with STORM COTTON™ technology. Moleskin is a filling face sateen that has been brushed and sheared for a velvety surface, an ideal fabric for adding a layer of warmth without adding too much weight. At a distance, the fabric appears to be a solid color, as you get closer you can see the texture of the topographic pattern. This fabric would be a great addition to the outdoor market with its inherent warmth and water resistance.

- **Lamination | Shiny Look, Technical Feel** - These woven and knit fabrications have been laminated on the surface with a polyurethane film. The addition of the layer of clear polyurethane adds a shiny appearance to the surface of the fabric. All the fabrics have an unusual techy hand and look that will work for fashion and home markets.

- **Mock Leno Weaves for Performance Through Construction** - Breathable shirting-weight fabrics and sheeting textiles potentially offer performance benefits and were researched through open pore, mock leno, and leno structures, using the in-house Sampling Dobby Loom. Finishing trials to optimize the ventilating structures commenced while additional yarn and construction experimentation continued. Full width weaving, at an outside facility, will follow on the most successful prototype once the optimum structure is determined.

FABRICAST™ Collection Metrics

During the stay-at-home order, PD prepared sample requests for major brands and retailers in a digital format in lieu of physical fabric sample booklets. Once the office reopened, certain requests were transformed to physical booklets. To date, a total of 99 companies have submitted 115 requests, for a grand total of 1,680 fabric samples disseminated to the industry. The following tables represent the top-requested fabrics in 2020.

### Top-Five Circular Knit Fabrics

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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>SK-2099-1B</td>
<td>18</td>
<td>Cotton/wool/spandex blend, sinker-loop terry Sherpa</td>
</tr>
<tr>
<td>SK-2150-1</td>
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<td>Cotton/XT2®+STORM COTTON™ technology blend, sinker loop terry</td>
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<tr>
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<td>Cotton/wool blend, sinker-loop terry Sherpa</td>
</tr>
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<td>Cotton/wool blend, three-end fleece</td>
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<td>Natural Story – Mushroom Fabric</td>
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### Top-Four Flat Knit Fabrics

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<td>Laminated inlay bouclé</td>
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## Top-Five Woven Fabrics

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<td>Twill – Dual Technology – STORM + TOUGH COTTON™ technology</td>
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### Internal Swatch Cutting Services

The PD Sample Cutting area prepares fabric swatches and information for Cotton Incorporated’s fabric marketing and technical activities. The 2020 FABRICAST™ collection, including fabric hangers and technical swatch books, was distributed to the Cotton Incorporated offices worldwide. Additionally, fabric swatches were provided to the Fashion Marketing department for trend presentations, to GSCM for Importer Support Workshops, and additional swatches for customer meetings and presentations.

### Synthetic Fleece Alternatives

Cotton alternatives to synthetic polar fleece continue to be an important initiative. Additional developments focusing on this effort are in varying phases of completion. One project featuring a 75% cotton-terry indigo knit was released in the 2020-1 FABRICAST™ collection. Prototyping on a textural fleece alternative fabric with corrugated ridges on one side to trap air is showing promise on many sides: 100% cotton; will not require a flame-retardant finish; should perform better than a polar fleece.

### Cotton in Warp Knits

A PDI team traveled to Germany during the first quarter to meet with a major warp knitting machinery company. Successful, collaborative trials were run using cotton. This is an exciting development that can open new markets for cotton as warp knitting technology is mostly synthetic based.

### TOUGH COTTON™ No Resin for Sweaters

A sweater project treated with TOUGH COTTON™ technology, targeting opportunities to promote cotton in outdoor active apparel, progressed with additional lab trials planned. For a longer lasting product, the technology will increase resistance to abrasion especially at the elbows, a feature sought after by outdoor brands. The logistics of processing the sweaters to maintain a clean smooth surface while imparting the needed performance finish will continue.

### Lighter Weights and Construction

A study on yarn sizes and stitch length commenced on the newly installed fine gauge knitting machine to continue work on performance through lighter weights and construction.

### E-Textiles

Research and Development (R&D) continued into wearable electronics and smart textile technology. To monitor what is happening in this space PDI attends smart textile and e-textile conferences. By tracking e-textiles through industry connectivity, PDI stays abreast with technology trends. It is clear the technology trajectory is still full of possibilities. Efforts focus on how to best include cotton in the evolution of smart textiles. Ensuring cotton is included in the future of e-textiles is important as most of the work that is occurring is with synthetics.

### Cotton Knit Shoes

The development of 3D-knitted cotton shoes continued. Yarn sourcing for adequate stretch and compression remains a challenge. The first prototypes of cotton knit shoes with soles were completed and presented a variety of problems, as anticipated. The 3D electronic flatbed knitting machine, to be acquired later in 2020, will have added features to aid in building greater functionality.

### Cotton-Bale Twine Research

The PDI team participated in collaborative research into a cotton alternative to synthetic hay-bale twine, engaging a team of researchers from FP, PD, AERD, and FC. Challenges for this project remain including strength, durability, and cost.
Digital Warp Printing
With a focus on aesthetic design and structures, PD conducted trials with a Europe-based university to research and devise a method for digitally printing on cotton warps. Textile students from the university worked with technicians to first create designs, then digitally print the designs on cotton warp yarns, and finally produce a woven cloth. This project demonstrated the complexity of combing technical processes with fine art. The woven cloth is being translated into a digital print to illustrate the melding of craft with technology.

Cotton and Graphene
In coordination with Textile Chemistry Research (TCR) and PD, the PDI team commenced research into yarns containing graphene. A nylon 6,6 yarn with graphene molecularly attached was combined with cotton yarn in a prototype double-face knit construction. Manufacturers claim graphene possesses a variety of properties, including heat capture and retention. The next phase is to move from small lab scale work to producing adequate yardage for garments to be made and tested.

Woven NATURAL STRETCH™ Fabrics
Interest from industry for stretch in pants without the use of synthetics, including spandex, prompted a renewed push to develop updated NATURAL STRETCH™ cotton wovens. Comfort stretch in 100% cotton wovens are achievable via fabric construction and slack mercerization. Identifying partners to collaborate with on mill-based trials has been a challenge because of the worldwide COVID-19 pandemic. Once there is more stability in the supply chain and retail reopens, mills will be more inclined to conduct collaborative R&D activities. Lab-scale preliminary work will be done in the Research and Technical Center; however, getting suppliers in place for industry adoption remains essential.

Fit and Flare Knitwear
The fit and flare concept creates excess fabric in certain areas to allow a garment to fit the form or to create desired flare (volume) in specific areas. Three-dimensional shaping in fabric through machine programming lends itself to sustainability by reducing yarn and fabric waste. Two different methods are being employed for fit and flare. One method is doubling, to create a pleat or ruffled effect by using a larger number of needles and then transferring over to a smaller number of needles. Another method is gore, used to create an A-line shape by knitting triangular pieces to other similarly shaped pieces. By turning the fabric for mounting, the end garment is smaller at the top and wider toward the bottom of the hemline.

TOUGH COTTON™ Technology on Sweater Knits
To improve the performance characteristics of 100% cotton sweaters, trials were designed to develop a process to improve the durability and abrasion resistance of sweater knit fabrics by using TOUGH COTTON™ technology. The goal of this research was to establish a process for applying TOUGH COTTON™ technology to sweater knit fabrics utilizing the machinery capabilities typically found in sweater garment finishing facilities. Trials were conducted and documented using two typical procedures, the dip & extract method, and the metered addition process (MAP). Lower cure temperatures were also studied and determined to be possible in a lab setting. Scaled trials are pending.

TOUGH COTTON™ Technology for Yarn
Research has been conducted to provide a method for applying TOUGH COTTON™ technology to cotton yarns that can be knitted into socks or other substrates. All completed yarn application trials in the Dyeing and Finishing Applications Laboratory (DFAL) have been written into technical reports. Various suppliers’ products have been evaluated and approved. A mill in Asia is currently running a production trial for an interested brand.

Flame Retardants for 100% Cotton Fleece
The scope of this project is to develop an environmentally friendly flame-retardant system for 100% cotton fleece fabrics. Preferably, the flame-retardant system can be co-applied with STORM COTTON™ technology. The previous DFAL trial had problems that appear to be due to hydrolysis of the non-formaldehyde flame retardant finish in hot, humid conditions from the DFAL and warehouse in summer climate. A test has been developed in the environmental chamber in the DFAL to simulate the ageing of the finished fabric. Plans are in place to continue the lab trials and ageing tests. The most recent lab trial indicated that a “buffer wash” in lieu of the water-only process wash may help to alleviate the hydrolysis of the finish, so the new trials will focus on the buffer wash.
PUREPRESS™ Finish Optimization on Cotton Knits
Optimization studies help determine the best overall parameters for applying recently developed non-formaldehyde resin technology to cotton knit fabrics. In addition to durable press performance, wicking and drying time performance will be examined. A division-wide project is underway to test a set of cotton knit fabrics using different spinning systems and fabric constructions, both with and without yarns treated with TransDRY® technology. The stronger interlock fabric will be bio-polished with cellulase enzyme; the jersey fabric will not be enzyme treated due to strength concerns. Lab strikes will be performed with PUREPRESS™ finish to predict the strength loss and performance of these fabrics prior to finishing in the DFAL. Fabrics have been knit and are currently being prepared and dyed.

Dual Technologies
Combining Cotton Incorporated technologies debuted in 2019, with a continuation into 2020. Combinations of technologies create cotton fabrics with additional levels of performance to better compete with synthetics. Various combinations are evaluated for strength, comfort, and increased levels of performance.

- **WICKING WINDOWS™ + TOUGH COTTON™ Technologies** - Investigated the potential to combine WICKING WINDOWS™ + TOUGH COTTON™ finishes for improvements in both moisture management and abrasion resistance. Rotary screen print trials using WICKING WINDOWS™ finish were conducted at the end of the fourth quarter in 2019. The trials included C6 fluorinated prints and non-fluorinated prints, on both knit and woven fabrics. The TOUGH COTTON™ finish had a negative impact on wetting time for prints with the non-fluorinated WICKING WINDOWS™ finish. Additional laboratory trials were conducted in the second quarter 2020, to optimize the non-fluorinated combination formula.

- **Soil Release + STORM COTTON™ Technology** – Seeking to develop a STORM COTTON™ treatment that is dual action, can repel water and release stains after 30 Home Laundry Test Data (HLTD). This combination evolved from a brand request for a STORM COTTON™ treatment that also released stains. Multiple lab trials have been attempted to release corn oil staining after five HLTD with a five rating (perfect) and a four rating after 30HLTD, plus repel water with a 70-spray rating or higher. The industry standard for soil release, when tested with corn oil, is a three rating after five HLTD. Soil Release + STORM COTTON™ technology (TCR20-05) surpasses the established industry standards when tested in the TCR lab. Confirmation testing is ongoing.

- **WICKING WINDOWS™ + PCM + Sweat Hiding™ Technologies** - Developing a soft hand, durable print combination that is applicable to knits and allows sweat to absorb into the back side of the fabric but not soak through. Acrylic Phase Change Material (PCM) 28°C combined with non-fluorinated WICKING WINDOWS™ treatment was screen printed on large rolls of fabric offsite. In addition, a C6 version of the Acrylic PCM + WICKING WINDOWS™ was printed on one side and C6 Sweat Hiding™ finish was printed on the other side of the fabric. The dual print technology containing WICKING WINDOWS™ with PCM for non-fluorine chemistry and WICKING WINDOWS™ with PCM plus Sweat Hiding™ technology with C6 formulation were successfully scaled up on the knit fabric constructions at this trial.

- **Incorporating NATURAL STRETCH™ Technology** - The goal here is to develop new NATURAL STRETCH™ woven samples for the FABRICAST™ collection, in combination with TransDRY® and PUREPRESS™ technology. There are new opportunities for 100% cotton stretch fabrics to replace blends with cotton and elastic fibers or yarns, especially in view of the concerns about synthetic microfibers in the environment. Production trials have been successfully run combining NATURAL STRETCH™ with PUREPRESS™ technology. A mill has been contacted by PD to provide quotes for creating NATURAL STRETCH™ fabrics, with and without yarns treated with TransDRY® technology. There are also efforts to find a denim mill that would process engineered denim fabrics for NATURAL STRETCH™ technology.

Bis-ether-di-quat (BEDQ) Cationization Of Cotton
Staff is pursuing development of a new cationization of the cotton platform, based on a newly patented cationization molecule from a major chemical supplier. Throughout the second quarter, the TCR team worked through all the data collected in experimental trials and created graphs and analysis. A draft report has been started. Prior to the COVID-19 pandemic, TCR had discussed and planned to collaborate with a brand, highlighting the usage of this chemistry that perhaps might be taken up again in the future.
Newness Retention for Cotton
A finish application for cotton that will extend the as-new appearance of a cotton garment is being developed. This includes improving smoothness, abrasion resistance, and color retention. The TCR team has zeroed in on a complex multi-functional recipe and a simple three-component recipe for color retention only. The next phase will be to evaluate these finishes on similar fabrics and colors as previous trials.

Cotton to Sugar
A process is being refined that allows cotton-based textiles to be enzymatically digested into sugar for the potential to further obtain ethanol or other value-added products. Many experiments have been carried out to strip and/or remove and mitigate color on garments to improve hydrolysis efficiency. The use of co-additives, such as bovine serum albumin (BSA) and a sodium surfactant, have been evaluated to improve hydrolysis efficiency. The TCR team is in the process of preparing a full patent filing from the provisional patent filed almost a year ago.

Durable Thermal Regulation Finish for Cotton
Research is being conducted on a non-formaldehyde thermal regulation finish for cotton that is durable and incorporates a moisture management technology. The TCR team worked with new vendors to find different sources for PCM to print on substrates. Multiple lab trials have been conducted for different formulations on various types of both knit and woven fabrics. The best formulation and recipe to work with on cotton substrates was identified and the differential scanning calorimetry (DSC) results for the prints came out very well.

3D Printing and Injection Molding
The department is continuing developments with cotton-rich 3D print filament and injection molding resins by printing 3D objects, using the newly developed filaments, then evaluating their performance. 3D printing is a growing market with opportunities to introduce cotton in the mix. The TCR team is working with a new company to compound cotton/polylactic acid (PLA) and then test the material to help identify the best combination that can be scaled up to make 3D print filaments and injection molding. Several cotton-based concepts produced in 2019 are being put into production, including makeup brushes and the Bogobrush toothbrush (which will be carried by CVS).

Thermal Technology
Researching to improve the thermal behavior of cotton rich substrate using resources that contain graphene or minerals. Data was collected on different knit structures of fabric containing graphene to help identify the proper structure and dye combinations useful for thermal application. Fabric was knitted using the selected structure pattern. The TCR team is working with an outside lab to analyze the complete data collection.

Outside Research: Recycled Textiles to Bio-based Building Blocks — Technology and Business Development Toward Pilot Demonstration
The goal of this study is to further evaluate the use of mechanical refining to pretreat cotton textiles for enzymatic hydrolysis. With the labs being closed due to the COVID-19 pandemic, the principle investigators are carrying out an in-depth literature review to determine the current state of the research and technology of converting cotton into sugar. The goal is to publish this information then have it serve as a baseline for future work.

Outside Research: Producing Nanocellulose Reinforced Lightweight Composites Using An Integrated One-Step Process From Cotton Waste Fabrics
The goal of this research is to study the effect of cotton-waste fabric pretreatments on fiber nano-fibrillation and fiber dispersion in compounding and extrusion. To investigate compounding/kneading parameters on nano-fibrillation and composite properties, polypropylene (PP), PLA and acrylonitrile butadiene styrene (ABS) matrix polymers are being used. Applications of the reinforced composite will then be demonstrated through 3D printing. The final step will be to compare the reinforcing effect of cotton waste fabric to that obtained from the pulp. This research has been put on hold due to the COVID-19 pandemic.

Outside Research: Anaerobic Decomposition of Cotton Fabric Under Simulated Landfill Conditions
This research was designed to evaluate the rate and extent of the anaerobic biological decomposition of three types of cotton fabric under simulated landfill conditions, and then compare the decomposition behavior of cotton fiber to a synthetic polyester. Laboratory work at North Carolina State University (NCSU) has been suspended due to the ongoing COVID-19 pandemic.
Materials for this project were prepared in the DFAL and collected by a graduate student in January. The reactors required for testing had not been initiated prior to shut down and came back on-line in June. It is hopeful research will resume in 2020.

Outside Research: Microfiber Degradation in Aqueous Conditions
In 2019, PDI began a new phase of this work to study how finishes affect degradation in freshwater and seawater environments. In 2020, 100% cotton fabrics, finished with different dyes and chemicals, are being exposed to the same conditions as in previous trials. The treatments include a reactive blue dye, a silicone softener, a C6 water repellent, and a formaldehyde containing durable press (DP) resin. The cotton fabrics are being compared against a micro-crystalline control as well as against an oak leaf, something that would naturally find its way into the water supply. The above samples were exposed to wastewater inoculum and the results indicated that while all of the treated cotton samples degraded, the finishes that were cross-linked to the cotton (DP and water repellent) do slow the degradation rate of the samples. Work in freshwater and seawater environments is pending. Laboratory work at NCSU had been suspended due to the ongoing COVID-19 pandemic. The reactors required for testing had not been initiated prior to shut down and came back on-line in June. It is hopeful research will resume in 2020.

Outside Research: Fundamental Studies of Cotton Fabric Dyes, Finishes, and Their Degradation Products in Aquatic Ecosystems
The goal of this study is the identification and quantification of degradation products generated in previous aquatic degradation projects. Water samples from aqueous degradation of cotton fabrics with Reactive Blue 19 (RB19) were analyzed and multiple forms of RB19 could be identified in mass spectra. Also, water samples from aqueous degradation of cotton fabrics with different types of finishing including DP finishing were analyzed and data suggested that dimethylol dihydroxy ethylene urea (DMDHEU) crosslinker with one substitution of diethylene glycol could be observed after biodegradation in aqueous condition. Laboratory work at NCSU has been suspended due to the ongoing COVID-19 pandemic.

Outside Research: Cottonseed-Oil Based UV-Curable Resins for Composites And 3D Printing
This research is to synthesize UV-curable resins from cottonseed oil then characterize the resin properties. To convert most of the cottonseed oil into a modified version, the process parameters must be optimized. 3D printing will be used to show proof-of-concept when developing final composite material. The preliminary synthesis was completed on the cottonseed oil before the lab was closed due to the ongoing COVID-19 pandemic.

Strategic Objective 2: Optimize and implement products and technologies to advance cotton in global markets.

Preparation for Installation of New Machinery
In March, FP finalized purchase arrangements for a new cotton opening/cleaning line with contamination detection equipment. Planning and lab preparations with peripheral items such as electrical controls, compressed air, and ductwork modifications will be completed prior to machine arrival. This new equipment is scheduled for installation in the fourth quarter.

Gin Contamination Detection Trials
In February, the FP team traveled to a gin in Georgia to assist with commercial gin testing of the new VIPR contamination detection system in association with USDA and major machinery manufacturers. While the VIPR system removed over 80% of bale wrap during the trial, the remaining contamination can still prove extremely problematic for spinning mills. The resulting bales were delivered to FP and will be evaluated following the installation of new contamination removal machinery in the fourth quarter.

Production of High-Quality Yarns for Fine-Count Knitting
Fiber Processing prepared over 350 pounds of high-quality Ne 40/1 combed cotton yarns on the Vortex (MVS) compact ring and conventional ring spinning systems for evaluation on a recently installed fine gauge knitting technology in the PDL. Additionally, finer 100% cotton ring-spun yarns in Ne 50/1 and Ne 60/1 yarn counts are planned for production in the FPL during the second half of 2020 using U.S. Upland cotton.

Support of PD Woven Yarns
In support of PD’s efforts to develop “breathable” bottom weights in collaboration with a large industry producer, the FP team selected appropriate U.S. Upland cotton to engineer Ne 14/1 carded rotor-spun yarn.
Spinning Component Effect on Fabric Appearance
Technicians in FP conducted a rotor component study on the open end (OE) spinning frame to determine effects of rotor profile on 100% cotton yarn physicals and performance in fabric. Initial tests indicated improved hand based on usage of specific rotor profiles. Results will be utilized by the FP team in providing technical service to spinning mills regarding production of fabrics engineered to meet specific tensile, appearance, or hand standards.

Technical Service Support with Yarn Spinners And Manufacturers
The FP team provided technical service through a plant visit with a large U.S. vertical manufacturer as well as numerous technical service requests from U.S. and International textile mills and brands. Contact encompassed discussions and shared information vital to finalizing decisions regarding the installation of contamination detection and removal equipment in the FP opening/carding line. Technical assistance included cooperation with the EFS® Technical Service group to evaluate barré issues with a potential customer in South America. New questions and analysis efforts resumed in June as staff returned to the Research and Technical Center.

Evaluation of Utilizing Recycled Fiber
A project initiated in the FPL aimed to develop a novel approach to utilizing recycled denim shoddy to create opportunity for circular cotton recycling. This development utilized denim shoddy in various percentages and methods of introduction into the sliver process to create interesting random slub effects in ring spun yarn. Feedback from the PD team on the initial yarn and fabric trial proved very positive. Additional yarn and fabric developments will continue in the third quarter to create opportunities for use of recycled denim fibers in new cotton fabric developments.

Evaluation of High-Performance Ring Spinning Components
Fiber Processing spinning technologists performed multiple spinning studies on advanced pendulum drafting components for ring spinning technologies in the FPL. Studies revealed that pendulum arms provided an improved level of fiber control in the draft zone compared to the older drafting components. Based on improved yarn quality and relatively low cost of the components, FP upgraded one of its ring spinning frames with these new pendulum arms.

Nonwoven Development
The FP team led cotton nonwoven development trials at a nonwovens facility in Clover, SC. The substrates investigated the use of virgin and bleached cotton with high percentages of recycled t-shirt and denim shoddy. The samples will be tested for sound and thermal properties. Successful results could mean a considerable increase in cotton usage across multiple industries, aiding in the displacement of synthetic fibers.

Evaluation of Available Industry Technology
The FP team initiated in-house meetings with machinery manufacturers for improving fabric skew control for yarns/knit fabrics through the latest conditioning technology. The team also investigated newly available novel yarn technologies that offer effect yarns for increasing interest/demand for cotton or cotton-rich yarns and fabrics.

Increased Library of Technical Knowledge
Six technical/research reports were completed by the FP team for technical services provided to mills, manufacturers, and retailers world-wide. The team also increased their knowledge base through online training resources and participation in many webinars. The scope of R&D efforts can be narrowed based on learnings from these studies.

Technical Assistance
Product Development provided technical fabric development expertise to evaluate spinning systems, new finishes, and fabric defects. Mill sourcing requests especially for U.S. based suppliers saw an increase. Fabrics were developed in support of the ISP workshop program and for research into new yarn treatments. The PDL completed several internal knitting projects for departments across PDI in support of TCR and Cotton Incorporated’s technology implementation.

Cold Pad Batch (CPB) Bleach Wetter Evaluation
For CPB dyeing to be successful, the fabric must wet out thoroughly, evenly, and instantaneously in the dye trough prior to being squeezed through the pad nip rolls. The purpose of this research is to develop a CPB bleach formula that adequately prepares 100% cotton knit fabric for dyeing using chemical auxiliaries currently available in the market. In all, 21 lab trials have been conducted, over the course of six trial sets, on swatches of 100% cotton interlock knit fabric. Samples have been submitted
for testing and preliminary results indicate that modifications to the bleach formula, as well as the addition of a specific wetter, are required.

Effect of Multi-Functional Reactive Dyes on The Dye Uptake Differences Between Non-Fluorine Yarn Treated with TransDRY® Technology And Untreated Yarn
An initial research project, designed to determine the cause of the dyeability difference between non-fluorine yarn treated with TransDRY® technology and untreated yarn at a Peruvian mill, concluded that the number of reactive groups in the dye molecule had the biggest effect on the increase in dye uptake. The goal of the second phase is to research the effect that multi-functional reactive dyes have on the dyeability differences between non-fluorine yarn treated with TransDRY® technology and untreated yarn. Initial lab dip formulas have been created to dye-out primaries of the multi-functional dyes on jersey knit fabric containing wide stripe (1.5 inch) feeds of non-fluorine yarn treated with TransDRY® technology and untreated yarn, used in the previous study. These formulas will be dyed-out in the third quarter.

Non-Fluorine Durable Water-Repellent Optimization (Non-Denim)
The goal is to evaluate performance of non-fluorine water repellents for use in STORM COTTON™ technology formulations. The standard testing procedure for STORM COTTON™ technology, run on a white twill fabric at four cure temperatures, to compare different STORM COTTON™ treatments with spray testing, and evaluated by AATCC Test Method (TM) 22, water absorbency spray rating (WASR), and water retention (WR) dry time testing. A technical report is available, TCR20-31, to present the four cure durations that are required to equally cure the STORM COTTON™ technology treatments between 137-170°C and the effects of residual detergents.

Non-Fluorine STORM COTTON™ Technology Treatments Applicable to Denim
The evaluation of performance and durability of non-fluorine water repellents for use in STORM COTTON™ technology denim-treatment formulations are the goal of this project. Formulations developed for “rinsed only” dark shades of denim fabrics, the most difficult, were not applicable for light shaded indigo-dyed denim test specimens. In lab production results the STORM COTTON™ finish produced a green tint after curing on light shaded indigo-dyed denim fabrics. One theory was that the indigo dyes were reduced into their water-soluble states by the emulsifiers within the non-fluorine finishes, because water rinsing easily removed this discoloration. Based on spectrophotometer readings two methods were found to reduce discoloration. Lowering the cure temperature to 137°C, reduced green discoloration by over 75%. And a non-fluorine water repellent, REPELLAN V5 provided durable water repellency with the least shade change after curing.

TransDRY® Technology Component Evaluation
The goal of this project is to evaluate new chemistry for use in TransDRY® technology. As demand increases, more options are becoming available for C6 and non-fluorine water repellent applications. This project continually evaluates new chemistries in effort to optimize both performance and price. A shear stable C6, excellent for the rigors of yarn application, was approved for production. The non-fluorine workhorse, TransDRY® technology, is no longer available, but an alternative was found that can be applied at lower levels. In replacing a large particle size polyfunctional blocked isocyanate (PBI), a macro-emulsion (looks like milk when diluted in water), was found to reduce the application concentration needed of a micro-emulsifiable PBI (looks clear in water when diluted).

PUREPRESS™ Technology Implementation Support
While the COVID-19 pandemic has slowed mill trials and production, activity continues with the PUREPRESS™ technology. Several brands have continued to run mill trials on the PUREPRESS™ technology with the most interest coming from a major U.S. shirting brand.

- Trials were run by a major vertically integrated apparel operation with very good results. The brand is pleased with the testing results, hand-feel, and look of shirts made from trial fabrics. At the end of the second quarter, the brand was reviewing the chemical product list. They have commented that they want to be the first in the men's shirting market to offer PUREPRESS™ technology.
- Testing at a second mill has been completed and will move forward as a licensed supplier of PUREPRESS™ technology. This will provide a second supplier for the major apparel brand.
- Recently an addition mill ran PUREPRESS™ technology trials on cotton/spandex fabrics with excellent results. Formaldehyde levels were less than five parts per million (ppm) and the smoothness ratings equaled the control samples at 3.5 which aligns with licensing requirements.
TOUGH COTTON™ Technology Optimization
Technical Services and Implementation has worked closely with TCR to optimize the TOUGH COTTON™ technology for a wider variety of applications. Multiple trials were run in the DFAL to collect data. The formulation of TOUGH COTTON™ technology was adjusted, removing resin, to run on yarn packages in response to a brand request. This application will be used in the sock market category. In response to another major brand, the DFAL and TCR optimized the application of the TOUGH COTTON™ technology on sweater fabric, using a garment application.

TOUGH COTTON™ Technology Implementation Support
During the first quarter, interest in TOUGH COTTON™ technology was led by a major new brand. A major supplier for the brand has submitted numerous samples and all have passed with excellent results; except for one fabric – a faux denim. During the second quarter, TSI continued to support the brand’s effort to obtain licensing by evaluating samples. Two other major brands have shown interest in the TOUGH COTTON™ technology. Samples submitted for them have performed well. The Product Evaluation Lab continued testing samples through the second quarter.

WICKING WINDOWS™ Implementation:
Trials were run in Mexico and Turkey in support of WICKING WINDOWS™ technology being launched through a major band’s classic t-shirt, designed for both men and women. The mills submitted excellent performing fabrics, with product available in stores and online during the first quarter. Two additional mills in Mexico City have also run trials and adopted the WICKING WINDOWS™ technology for release in Latin America. A third mill will run a program out of Mexico and Peru, with trials planned during the third quarter.

STORM COTTON™ Implementation
Despite the ongoing COVID-19 pandemic, three major brands have all continued to run their STORM COTTON™ technology programs. Two mills in the U.S. (California and South Carolina) continued production through the pandemic shutdown for the brands.

New Non-Fluorine Repellent Implementation
A new non-fluorine repellent and cross-linker identified recently by TCR shows excellent performance in both the TransDRY® and STORM COTTON™ technologies. Both chemicals are from the same manufacturer. Trials are scheduled for the third quarter.

NATURAL STRETCH™
A joint meeting between TSI, TCR, GCSM, and a major supplier was held virtually to discuss NATURAL STRETCH™ technology. It was agreed that the DFAL will run trials during the third quarter as the next phase of implementation.

New Machinery
The most advanced airjet spinning technology, a Murata MVS 870, was installed in 2018. The machine has the ability to run at higher speeds while producing better qualities than the previous MVS technology. In 2019, the FP technicians performed a complete spinning limit trial from Ne 12/1 – 60/1 yarns and developed “soft hand” MVS yarns. A control MVS and best “soft hand” MVS yarn were spun and sent to PD for knitting. The fabrics will undergo a full evaluation after they are dyed and finished.

New, AgTek Multi-Function winders were installed in May 2019. Setup and initial testing were completed with utilization underway to produce yarns for PD in the area of flatbed knitting. Yarn packages, with up to five plies, were produced from fine count yarns of multiple colors, then transferred to knitting for eventual fabric trials. Additional testing being performed on “fancy” or “slub” yarns is creating cotton yarns with elastane cores, as well as conventional “covered” yarns.

Technical Service Meetings with Yarn Spinners and Manufacturers
Fiber Processing provided technical services at a mill for a domestic spinner, minimizing problems associated with cotton crop change, with the assistance of the Product Evaluation Lab (PEL), who analyzed test data to advise optimum process settings. The FP team also provided support to a U.S. supplier of ASTM standardized test material, for use in worldwide Random Tumble Pilling Tests. For controlled processing, the test material will be processed in the PFL, adding a combed sliver, then delivering back to the supplier.
Production of High-Quality Yarns for Shirting Research
In support of PD, FP produced high-quality warp yarns for a shirting development. The yarns were produced from a laydown of a high-quality Upland cotton. After a premium level of combing, yarns were spun on a compact ring spinning system to produce superior softness with lower than normal twist. This yarn will provide support in the development of higher-quality lightweight shirting material produced from Upland cotton.

Combing Quality Research
To advance the production of higher-quality combed cotton yarns, FP conducted research, specific to the combing process, for technical service use with yarn spinners. Three rates of short-fiber (noil) and two directions of fiber-feed were selected to determine optimum combing efficiency and yarn quality for today’s longer Upland cotton. Ring spun Ne 30/1 yarns were produced to represent all variables and a technical report is pending upon completion of all physical testing.

Cotton Origin Project to Evaluate Capability of Potential Fiber Identification Technology
Fiber Processing provided fiber, yarn, and fabric from two known states for evaluation of a potential fiber identification technology. Processed sliver, and carded ring-spun yarns, were spun for comparison purposes. With the combined assistance of PD and the Dyeing, Finishing and Analytical Labs (DFAL), both greige and dyed fabric, slated for t-shirt production, were also delivered. All samples were then provided for testing to determine origin of the raw cotton used.

Evaluation of U.S. Grown Raw Hemp Fiber Blended with Cotton
Cotton Incorporated’s FP team engaged in development work to evaluate the feasibility of spinning cotton/hemp blends on a short staple spinning system. The hemp was up to 7 inches long and contained very coarse fibers. The FPL evaluated a blend of 87% cotton with 13% hemp (as delivered). The hemp resembled the baryk plant material sometimes found in raw cotton. The FPL technicians did not experience any major issues in opening and cleaning, carding, drawing, or roving. However, once the material was taken to spinning and set up for Ne 20/1, the ring spinner realized 100 times more ends-down per spindle hour, than what is normally acceptable on the ring spinning frame. This type of ends down rate is not commercially viable and related directly to the coarseness of the hemp fibers. The trial concluded as follows:

- Quality of hemp sent for this trial is not suitable for the short staple spinning process.
- Yarn experienced 100x the normal ends down in ring spinning of Ne 20/1 yarns.
- Hemp suppliers should find partners that are developing refining machinery that can better prepare the hemp for short staple spinning with cotton.

Developments on Amsler Core Spinning/Wrapping Technology
Following, the installation of an Amsler “Wrap Yarn” system on an existing Zinzer 351 ring spinning frame, FP continues developing parameters to improve the operation of this new wrap-yarn effect yarn. The goal is to produce a final yarn with improved hand and/or special performance and visual attributes. While the initial fabrics produced from this effect yarn showed promise, machine efficiency (and ultimately commercial viability) remains a major hurdle. Because of the way the yarn is produced, the friction created when knitting causes excessive fly, which in turn can build up around the needle bed. To overcome this issue, the knitting frame was slowed to approximately 50% normal speed and stopped often for cleaning the excess fly. Additional testing will be required as more fabric is produced to determine colorfastness, pill rate, and overall durability. During meetings in May and June, the FP team conveyed issues to the machinery manufacturer to try to assist in creating positive solutions. Fiber Processing will continue to work on this interesting but problematic novelty attachment.

Internal Fabric Development Assistance
PD provided technical fabric development expertise to evaluate seed varieties, spinning systems, and new finishes. Fabrics were developed in support of the ISP program and for research into new yarn treatments.

Cotton Incorporated Technology Implementation Advancements
The Technical Services and Implementation team remains at the forefront of expanding Cotton Incorporated’s technologies through continued research and internal optimization trials. Work includes internal and external technical assistance, production scale trials, and implementation services with mills and manufacturers to advance cotton in global markets. The following are key advances made to date in global markets.
Implementation of the PUREPRESS™ technology continues with numerous trials run and scheduled. Trials have advanced by mills interested in becoming licensed suppliers of the technology, as well as brand interest. Mills in China, S.E. Asia, Pakistan, India, Mexico, and South America have run trials, or are planning to run trials in Quarter 3 of 2019.

Implementation and support of TOUGH COTTON™ technology remains strong with more mills and brands running trials (largely in S.E. Asia). Testing submissions from trial and production runs increased in 2019.

Implementation trials using STORM COTTON™ and TOUGH COTTON™ technologies without resin, plus TransDRY® technologies, continue with new brand and mill interest.

The TSI team is assisting a U.S. brand in expanding their U.S. supply chain of the STORM COTTON™ technology.

The experimental-implementation efforts surrounding joint research, known as the TransDRY® Dyeability Project, continues to progress since last reported in December 2018. This joint project, with TCR, supports the changeover of several South American mills to non-fluorine TransDRY® technology later in 2019.

Cross-divisional support has been critical in the development and application of dual technology fabrics in the DFAL with the Dyeing and Finishing Lab processing close to 200 pounds and 250 yards of fabric for this project alone, producing a total of 1,800 pounds year-to-date for a variety of internal research, FABRICAST™ collections, Marketing support, and/or technical support services. The Analytical Lab has processed 49 service requests to date, with the Technical Services team processing 187 service requests year to date.

Each department within PDI works together continuously providing technical fabric-development expertise at every stage of the process. Their expertise is utilized in the annual evaluation of new seed varieties, novelty yarns, smart fabrics, or performance finishes which hopes to regain lost-shares from traditional markets while advancing cotton into new markets.

Strategic Objective 3: Augment cotton marketing activities/influence industry decisions through technical avenues such as standardization and education.

International Textile Standards Support
Proposals for international standards on sustainability-related topics continue to increase. In 2020, the International Standard Organization (ISO) Technical Committee (TC) on Circular Economy created the first four working groups (WG) and began the three-year process of creating standards about principles, terminology, methods of measuring, and guidelines on implementation of the Circular Economy. In June, the second plenary meeting for the committee, and the first for the WG, was held virtually. Product Integrity (PI) participated as a U.S. delegate and expert to WG-1. At the same time, ISO TC 38 on Textiles, held a vote that proposed a new standard (and WG) to outline environmental vocabulary for textiles. The TC 38 has another new WG on microplastics from textile sources. This ISO/TC38/WG34 has two methods in development related to measurement of microplastics in laundering. In May, discussion of a smaller-scale test method for microplastic release continued in the AATCC Sustainability Test Methods meeting.

Life Cycle Assessment (LCA) Support
Product Integrity (PI) is a voting member of the SAC-led Technical Secretariat which is writing rules for use of LCA to conduct product tracing/footprinting of apparel and footwear in Europe. Beta testing and continued development of the Higg MSI v3.0 and the Higg Product Tool, occurred during participation with the Sustainable Apparel Coalition (SAC) Product Advisory Council in the first half of 2020. The Higg MSI v3.0 and the Higg Product Tool are scheduled for release in summer and fall 2020, respectively. The cotton LCA data, desired for MSI 3.0, was confirmed to be available upon release. Product Integrity has also supported Cotton Council International in efforts to expand use of the U.S. Cotton Trust Protocol within the Higg tools.

Digital Supply Chain
Product Development provided fabrics for the GSCM digital-supply chain initiative. The goal is to convert physical fabrics into digital image files of fabric for use in 3D-apparel modeling software programs. All the provided fabrics were sent to agencies, that can scan and measure the fabrics, to create the specific file type the 3D software program requires. The goal is to have digital avatars of each FABRICAST™ collection development, accessible to customers who visit the CottonWorks™ website. Product Development is also offering neutral technical input on fabric physics as a volunteer member of the 3D.RC Group.
Digital Fabric Marketing Toolkits for Social Media And Product Marketing
During the stay-at-home order issued during the COVID-19 pandemic, special digital fabric collections were created for Cotton Incorporated social media channels and Websites; LinkedIn®, Facebook®, cottoninc.com, and CottonWorks™. Digital summaries and descriptions from FABRICAST™ collections were provided to support the digital collection on social media channels and Websites. This expanded reach resulted in thousands of page views. Pivoting efforts to provide digital cotton inspiration enabled the PDI division to continue marketplace influence.

Fabric Development for Outdoor Retailer Trade Show
Cotton Incorporated technologies, plus fashion focused techniques, were integrated for a garment collection created for the outdoor active market. These garments served as a main focal point at Cotton Incorporated’s booth at the January Outdoor Retailer Show held in Denver, CO. In addition, PD coordinated with Supply Chain Marketing (SCM) to highlight cotton fabrics as both functional and fashionable in the Trend Display. Four apparel categories were identified for the display: insulation, shell, base/mid layer, and outer layer. A total of 14 knit and woven developments addressed these categories featuring water resistance, thermo-regulation, antimicrobial, breathability, and moisture moving.

Industry Engagement
The PDI division pursues industry engagements to develop new ideas, source new cotton yarns, fabrics, finishes and equipment, as well as meet with vendors to discuss possible collaborations. Technical staff from PDI assisted Account Managers at Cotton Incorporated booths during trade shows, presenting new fabric developments and answering technical questions. Listed below are trade shows, conferences, and/or presentations the PDI team participated in.

In-person attendance:
- Outdoor by ISPO Trade Show, Europe (January)
- Pitti Filati, Europe (January)
- Outdoor Retailer Winter Market/Snow Show, U.S. (January)
- Premiere Vision, Europe (February)
- AATCC International Conference Event, U.S. (March)

Virtual participation during the stay-at-home order issued during the COVID-19 pandemic.
- Innovate Textiles America (April)
- Kingpins (April)
- ASTM D13 Executive Committee Meeting (May)
- USDA Panel Orientation Meeting (May)
- ISO TC323 Circular Economy Planning Meetings (May)
- AATCC Committee and Interest Group Meetings (May)
- AAFA Product Safety and Compliance (June)
- ISO TC323 Circular Economy Committee Meetings (June)
- ASTM Committee Week (June)

Technical Conference Participation
The FP team attended grower, ginning, and textile technical conferences consisting of the Beltwide Cotton Conference in Austin, TX, in January and the Southern Textiles Association’s Winter Technical Conference in Gastonia, NC, in February. Both conferences offered technical updates for the industry and networking opportunities for the FP team. These conferences supported FP’s ability to expand collaborative research and testing efforts with industry partners in 2020, especially in contamination reduction throughout the supply chain.

Garment Review
Product Development provided the Fashion Marketing department support through technical analysis of fabrics intended for the general, active, and denim trend presentations. The PD team spent numerous hours analyzing hundreds of fabrics, then held meetings with the trend team to provide detailed fabric descriptions. Adjustments were made, offering digital fabric images and information to support the trend presentations which took place virtually because of the COVID-19 pandemic. The feedback and response to the digital format and video meetings achieved a broad reach.
Industry Influence
Product Development and Implementation staff provided in depth presentations and tours to students and instructors from technical community colleges and universities at the Research & Technical Center during the first quarter. Members of PDI routinely assist AATCC not just in membership, but servicing on committee members, contributing to publications, and judging panels in research and competitions. Product Development staff served as judges for an AATCC apparel design competition, as well as for student projects at the university level. An article published in the AATCC Journal, *Bringing Fabrics Alive with Special Pigments and Finishes*, focused on PD innovations. An article in *Rivet* also focused on a PD denim collection.

Test Method Development: Water Absorbency Spray Rating (WASR) Testing
The goal is to develop a measurable water-repellency testing procedure that can be run in conjunction with AATCC TM22. Technical report TCR19-08 has been written and approved to describe WASR testing, the internal test methodology that was developed to measure the percent wet pick-up after spray testing. The developmental specification requires that test specimens treated with a water repellent dry 70% faster and have a water absorbency spray rating of 70 after 30HLTD. The WASR testing met developmental specification requirements and prevents discoloration on the outside fabric surface. This project was considered successful. WASR testing quantifies both the depth and duration of discoloration after spray testing. A presentation, including time lapse videos, was presented virtually to the AATCC RA63 subcommittee in May, describing how WASR testing can be run in conjunction with AATCC TM22.

Test Method Development: Water Retention Dry Time (WR) Testing
The goal of this project is to accurately represent the phenomenon of saturating a garment with perspiration during exercise followed by subsequent drying. Technical report TCR19-13 has been written to describe the development of this test methodology. Submerging samples in 100°F for 60 seconds, under continuous agitation, ensures that test specimens are subjected to an actual-use testing protocol by being close to the temperature of perspiration (95°F). Water Retention (WR) Dry Time testing measures submerged water retention (SWR), residual water retention (RWR), and the drying speeds of test specimens. Thereby this enables the calculation of the dry rates, per the percent of water absorbed, and the total dry time of each test specimen at maximum uniform-water saturation.
GLOBAL SUPPLY CHAIN MARKETING COMMITTEE

GLOBAL SUPPLY CHAIN MARKETING

Strategic Objective 1: Maintain a global presence for cotton.

An important tactic for maintaining a global presence for cotton is through direct account interaction with mills, manufacturers, brands, and retailers for the apparel, nonwovens, and home products markets. GSCM staff focus their efforts on influencing major brands and retailers through coordination of various Company resources, with the goal of influencing the use of cotton versus other fibers. During the first half of 2020, GSCM staff conducted more than 275 meetings with companies in both the manufacturing supply chain and with key brand and retailer accounts.

Staff exhibited at ISPO in Munich, Germany in January. ISPO is the largest outdoor sportswear show globally with more than 85,000 visitors from 120 countries. This year is the first year that Cotton Incorporated exhibited at the show and the booth themes focused on sustainability and product innovation with displays showcasing the latest garment and fabric collections, market adoptions, and marketing materials.

As tradeshows began to move online in 2020, Cotton Incorporated sponsored World Textile Information Network’s (WTIN’s) Innovate Textile Apparel & America digital tradeshow. The virtual conference focused on the latest innovations in manufacturing processes, materials, and emerging business models in the textile and apparel industry. Cotton Incorporated’s digital booth focused on technologies and promoted CottonWorks™ marketing platform as an industry resource.

As a result of the pandemic, the Mexico City office staff canceled a hosted event, but readjusted it into a digital format by offering two recorded presentations on cotton economics and on the findings of the Mexican childrenswear market study.

Mexico City staff participated as a panelist on a digital international forum discussing the impact of the pandemic and the future of the fashion industry, having the chance to position cotton as a competitive and sustainable fiber.

Additional participation in industry events included:

- Staff conducted a webinar, organized by the China Textile Information Center, to approximately 3,000 participants. The presentation included the latest consumer response to COVID-19, sustainability of cotton, and retail and consumer insights.
- Staff conducted a webinar in conjunction with the China Textile Information Center on Cotton’s Application in the Outdoor Market, which attracted a unique group of 1,765 participants.
- Staff conducted a webinar presentation on the China retail market. The presentation included a live question and answer session to a group of approximately 3,000 participants.
- Staff conducted a webinar through the platform of the China Textile Information Center. The “Outdoor Retail Market Research” webinar attracted a viewership of approximately 3,000.
- Staff attended a virtual Spinning Industry Operation and Cotton Yarn Supply/Demand Analysis Seminar.
- Staff attended a virtual denim technology review and line release by a Chinese-based Company.
- Staff attended a denim company’s technology and trend review seminar in China, which was attended by approximately 17,000 participants.
- Staff attended the Fashion Trend Webinar by China Textile Information (China), which attracted approximately 3,000 viewers.
- Staff attended the virtual 2020 China Yarn Expo Fair and Seminar. More than 80,000 participants attended the various presentation topics.
- Staff attended the annual Mexican Textile luncheon.
In its seventh year, the Cotton LEADS™ program continues to educate and inform retailers, brands, and manufacturers worldwide about responsible U.S. cotton production. Cotton Incorporated participates in this program with the National Cotton Council of America, the Cotton Foundation, Cotton Australia, and Cotton Council International. The program reached 640 partners. Two Partner Post newsletters went out to partners in five languages in the first half of the year.

During the first half of 2020, new Cotton LEADS™ partners were added in Latin America and Asia. One new partner in Mexico launched, in conjunction with the largest Mexican menswear brand, a communication campaign to support the sales of jeans labeled with the Cotton LEADS™ service mark while explaining to the shopper the importance of using U.S. cotton. A Hong Kong-based textile manufacturer, with mills throughout Asia, featured the Cotton LEADS™ program in the company’s Annual Sustainable Report.

The GSCM division is responsible for messaging to the trade. In 2020, consistent messaging and imagery was implemented throughout, including tradeshows, tradeshows promotional items and outlets, and other publications. Over 75 different print and digital assets were created to focus on multiple messages in the most effective platforms. Messages focused on the CottonWorks™ platform as a leading resource for cotton, performance, denim, sustainability, and circularity. Publication channels included Textile Insight, WSA, EcoTextile News, Sourcing Journal, and tradeshows magazines and websites.

In 2020, the GSCM division developed marketing materials to highlight cotton’s circularity story. In the first half of the year, staff worked with an agency to brainstorm and develop both a 2-D model that illustrates cotton’s circularity, as well as an interactive digital model that will be featured on the CottonWorks™ Website. The overall goal is to show that cotton is a circular fiber that comes from the earth and returns to the earth. These materials will be featured in future marketing efforts. Circularity is a priority throughout the textile supply chain and a new message has been defined and identified from a cotton perspective across multiple categories and utilizations.

There has been a concerted effort to re-establish cotton as a leading fiber in home textiles through a robust trade advertising initiative and marketing strategy.

**Strategic Objective 2: Develop and facilitate the adoption of product and technology ideas.**

The GSCM team also collaborated with Product Development to develop a range of garment collections that highlight innovation and creativity. Staff worked with a Portland-based company to showcase cotton in sweaters and activewear that incorporate TransDRY® and STORM COTTON™ technologies. These garment collections were displayed at the Outdoor Retailer and ISPO tradeshows in January and disseminated to staff in all global offices. The garments also were featured on the CottonWorks™ website.

The Digital Supply Chain initiative in the GSCM division is an effort to enhance the division’s marketing capability by incorporating the latest and most widely used 3D textile design tools. Work in this initiative included several activities such as:

- Identifying an industry partner to facilitate the creation of digital fabric files for FABRICAST™ developments using the CLO software;
- Working with a Hong Kong based design institute to initiate an activewear design collaboration;
- “Digitizing” an inventory of featured cotton fabrics; and
- Reengineering the CottonWorks™ Website to market digital fabric files.

Staff worked with six Asian fabric mills including three licensed technology suppliers to produce a collection of activewear using Cotton Incorporated performance technology fabrics and special bonding for aesthetics and seams. This is an initiative to utilize these tapes which historically are more compatible with synthetic fabrics.

Staff worked with a knit factory in Hong Kong to successfully produce seamless cotton garments for activewear products which are well sought after by sourcing companies. Staff continued to expand the products to include cotton performance technologies.
Seal of Cotton trademark and technology joint promotions included:

- Providing 32,611 WICKING WINDOWS™ technology hangtags to a Chinese sports brand in support of their adoption;
- Providing 5,000 WICKING WINDOWS™ technology hangtags to an online Chinese casual brand for a Spring/Summer 2020 product launch;
- Providing 198,000 WICKING WINDOWS™ technology hangtags to a Chinese children’s wear brand for a Spring/Summer 2020 product launch;
- Providing 9,966 TransDRY® technology hangtags to a Chinese fashion brand for cotton apparel products for Spring/Summer 2020; and
- Providing 100,000 Seal of Cotton trademark labels to a Hong Kong home textile brand for 100% cotton home textile products, including pillowcases, sheets, quilts, and sleeping bags.

Six new Seal of Cotton trademark licensees were added in Latin America from January to June 2020. One license was granted to a major global hygiene brand based in Mexico selling soap that contains cotton fiber. A cotton enhanced™ trademark license was also granted to three new licensees, an international Mexican-based brand launching baby diapers with a cotton-rich top sheet, a Mexican brand for wet wipes, and the first Brazilian brand for wet wipes.

Additional trademark adoptions included:

- A U.S.-based yarn supplier was licensed to use the Seal of Cotton trademark on 100% cotton yarns.
- A U.S.-based retailer was licensed to use the Seal of Cotton trademark across all knit and woven product categories in both home and apparel.
- A major paper company in Japan adopted the natural™ trademark on 100% organic cotton top-sheets for feminine hygiene products.
- A Korean nonwoven brand and retailer launched 100% cotton top-sheet feminine hygiene pads carrying the natural™ trademark in the Korean market.
- A Korean personal products developer and retailer launched 16 million pieces of 100% cotton masks carrying the natural™ trademark in the Korean market.
- A Chinese casual brand launched one million pieces of cotton apparel products with hangtags that carried the Seal of Cotton trademark and Cotton LEADSTM service mark.
- A Chinese casual brand launched 260,000 pieces of cotton apparel carrying the Seal of Cotton trademark and Cotton LEADSTM service mark on the hangtags.

In continuation with the promotion of new product ideas during the first half of 2020, two Mexican brands adopted the WICKING WINDOWS™ technology and a Peruvian brand adopted the TransDRY® technology. Technical assistance was provided to five manufacturers in Mexico, Peru, and Guatemala to develop and supply fabrics and garments with WICKING WINDOWS™, SWEAT HIDING™, STORM COTTON™, PUREPRESS™ and TOUGH COTTON™ technologies.

Commercialization of cotton technologies also included:

- A U.S.-based hosiery brand featured the NATURAL BLEND™ technology on socks.
- A U.S.-based textile manufacturer licensed TransDRY® technology for use across product categories including knit and woven athletic performance apparel and socks.
- TransDRY® and STORM COTTON™ technologies are in development with a major sock manufacturer in China.
- TOUGH COTTON™ technology is being used by a well-known garment manufacturing mill based in Korea.
- A major U.S.-based department store is now offering TOUGH COTTON™ technology on girls’ leggings.
A Japanese children’s wear brand launched 70,000 units of TransDRY® technology tee shirts in the Japanese market for Spring/Summer 2020.

A major Chinese sportswear brand launched 32,611 units of WICKING WINDOWS™ technology tee shirts featuring the technology on the hangtags.

A leading Chinese textile manufacturer produced 20 tons of STORM COTTON™ technology fabric for a U.S. sportswear brand for distribution in the Chinese market.

A leading textile manufacturer in China produced 135 tons of STORM COTTON™ for fleece technology fabric for a U.S. skate brand.


A U.S.-based fabric retailer launched the TOUGH COTTON™ technology on woven goods.

A well-known U.S.-based brand launched the TOUGH COTTON™ technology on girls’ leggings.

A men’s on-line retailer of upmarket clothing launched TransDRY® technology on 100% cotton polos and rugby shirts.

PUREPRESS™ technology has been adopted by a high-end apparel company across multiple products for men’s and ladies’ fashion.

A popular outdoor brand featured the STORM COTTON™ technology on men’s and ladies’ outerwear.

An active brand featured WICKING WINDOWS™ technology on 100% cotton men’s and ladies’ tee shirts.

A workwear brand continued their STORM COTTON™ technology program in multiple styles including tee shirts, pants, and jackets for men and ladies.

A lifestyle brand adopted STORM COTTON™ technology on a men’s outerwear program.

A workwear uniform company is now featuring TOUGH COTTON™ technology on men’s and ladies’ performance apparel.

An outdoor/active apparel brand has successfully adopted STORM COTTON™ technology on an outerwear program.

A well-known retailer is set to launch STORM COTTON™ technology for their men’s outerwear program.

A Chinese textile sourcing company and COTTON LEADS® partner has promoted NATURAL STRETCH™ technology in high-impact marketing materials displayed in their New York City showroom.

A leading sourcing company in New York City has promoted TOUGH COTTON™ technology for denim to a major U.S. apparel retailer.

A major textile mill in Japan successfully adopted TOUGH COTTON™ technology without resin on woven fabrics for a Japanese apparel company.

A knit fabric manufacturer in South Korea adopted STORM COTTON™ technology with non-fluorine chemistry for a U.S. multi-brand, specialty retailer.

A Taiwanese laundry and garment manufacturer with a manufacturing plant in Vietnam adopted STORM COTTON™ technology with non-fluorine chemistry in garment form for a U.S. multi-brand, specialty retailer.

A U.S. retailer initiated the adoption of TOUGH COTTON™ technology without resin in foil printed and solid dyed fabrics through a knit fabric manufacturer in South Korea.

A vertical textile manufacturer in Vietnam adopted TOUGH COTTON™ technology without resin for marketing to global markets.

A Taiwanese woven fabric manufacturer adopted NATURAL STRETCH™ technology.

A leading textile company in China adopted WICKING WINDOWS™ technology for a Chinese sportswear brand for their Spring/Summer 2020 collection.
• A leading Chinese textile company successfully adopted STORM COTTON™ technology for a Swedish clothing store to produce 1,000 pieces of woven cotton apparel.

• A leading U.S.-based workwear brand worked with two suppliers, one in Hong Kong and one in China, to successfully develop TOUGH COTTON™ technology without resin on woven cargo pants and knit tee shirts for the U.S. market.

• A large-scale shirting fabric supplier in China successfully developed PUREPRESS™ technology fabric for one of the largest U.S. casual wear brands.

• A Chinese textile company developed STORM COTTON™ technology for a French outdoor products brand.

• A vertical textile company in Vietnam successfully adopted TOUGH COTTON™ technology without resin for a U.S. outdoor apparel brand.

• A Hong Kong knit manufacturer adopted TOUGH COTTON™ technology without resin on children's leggings for a U.S. clothing company through a Hong Kong sourcing company.

• A Hong Kong knit manufacturer adopted TOUGH COTTON™ technology without resin on leggings for a U.S. retailer.

• A Hong Kong woven fabric manufacturer developed STORM COTTON™ technology on woven fabrics for a U.S. tactical apparel brand.

• A Hong Kong woven fabric manufacturer applied WICKING WINDOWS™ technology to shirting fabrics for a U.S. workwear brand.

• A vertical mill in Sri Lanka adopted STORM COTTON™ technology for menswear bottoms for a U.S. brand.

• A Hong Kong vertical manufacturer with its production base in China, developed PUREPRESS™ technology on men’s shirting for a U.S. fashion company.

• A large-scale Chinese woven fabric supplier successfully developed TOUGH COTTON™ technology with resin for a U.S. retailer.

• A large-scale woven fabric supplier successfully developed TOUGH COTTON™ technology without resin on bottomweights for a U.S. workwear brand.

Several other technology adoptions occurred during the first half of 2020. A well-known U.S. workwear company highlighted TOUGH COTTON™ technology as a key initiative at their national sales meeting. Division staff collaborated with them on key marketing points and a promotional video that will be shown to their sales team as part of the product launch. Several other workwear brands have adopted the dual technology of TOUGH COTTON™ with STORM COTTON™ technologies on outerwear and denim. A high-end handbag brand has adopted STORM COTTON™ technology on cotton travel bags and backpacks that will be sold at their own retail stores and online. A major athletic performance brand has adopted the TransDRY® technology on a collection of ladies’ athleisure tops and men’s sweatshirts.

Technical marketing and technical assistance continue to be essential for helping companies bring cotton products to market. In the first half of 2020, several important activities were carried out to provide this type of technical assistance for marketing cotton:

• Staff provided technical assistance to a leading textile company in China to develop TOUGH COTTON™ technology on products for a U.S. clothing brand and retailer.

• Staff provided technical assistance to a leading Chinese textile company doing bulk production for a U.S. retailer and 28,000 pounds of TOUGH COTTON™ technology fabrics will be produced.

• Staff assisted a Chinese textile company to develop the SWEAT HIDING™ technology on knitted fabrics. Development is part of their marketing efforts for the Chinese market.

• Staff provided WICKING WINDOWS™ technology technical assistance to a leading Chinese textile company supplying many major U.S. sports and casual brands.

• Staff provided technical assistance to a Chinese textile company to develop TransDRY® technology denim fabrics for a U.S. denim brand.
• Staff provided technical assistance to a leading Chinese textile company to develop TOUGH COTTON™ technology products for their U.S. customer.

• Staff provided technical assistance to a medium-scaled knit fabric supplier for expanding their WICKING WINDOWS™ technology product range from cotton underwear to cotton bedsheets.

• Staff provided technical assistance to one of the world’s largest shirting fabric suppliers to develop PUREPRESS™ technology shirting fabric. This Chinese supplier was asked to develop this product by one of their long-term customers based in Europe.

• Staff provided technical assistance to some sourcing companies and suppliers in Pakistan, China, and Hong Kong to develop TOUGH COTTON™ technology without resin on both knit and woven fabrics for a U.S. outdoor functional brand. Products included knit tees and woven bottoms.

• Staff provided technical assistance to a large-scale Chinese knit fabric supplier to develop STORM COTTON™ and TOUGH COTTON™ technologies for a U.S. functional outdoor brand.

• Staff provided technical assistance to a knitter in Bangladesh to develop TOUGH COTTON™ technology on men's, women's, and children's tees for the French and Russian markets.

• Staff provided technical assistance to two knitters, one in Hong Kong and another in China, to develop TOUGH COTTON™ technology on underwear, tees, and outerwear. They worked under the initiative of a leading Australia-based apparel brand.

• Staff provided technical assistance to a woven fabric supplier in Hong Kong to develop WICKING WINDOWS™ technology on men's shirts for a leading U.S. based apparel retailer.

• Staff provided technical assistance to two denim suppliers, one in China and another in Indonesia to develop TOUGH COTTON™ technology on denim for a leading U.S. based workwear brand. They worked through a Hong Kong-based sourcing company.

• Staff provided technical assistance to a cotton yarn supplier and a socks supplier in China to develop TOUGH COTTON™ technology blended socks for a leading Australia-based apparel brand.

• Staff provided technical assistance to a Japanese yarn-dyeing, knitting, and dyeing & finishing plant in Bangladesh to develop TransDRY® technology yarn and fabric. Technical advice on improving evenness was provided.

• Staff provided technical information to one of the largest Japanese department store chains on the TOUGH COTTON™ technology. Promotion materials at point-of-sale were discussed.

• Provided technical assistance to a Taiwanese knitting mill to develop TOUGH COTTON™ technology without resin, which was initiated by a U.S. retail store.

• Provided technical assistance to a Hong Kong woven fabric manufacturer with production base in China, to develop TOUGH COTTON™ technology on 100% cotton and cotton/spandex woven fabrics for a U.S. fashion brand.

• Staff provided technical support to the Japanese arm of an international shoe brand with their interest in developing TOUGH COTTON™ and STORM COTTON™ technology on shoes for 2022 and 2023. Information on fabric suppliers was also provided.

• Staff provided technical assistance to a woven fabric manufacturer in Hong Kong with production base in China to develop TOUGH COTTON™ technology canvas fabric for an international shoe brand in Japan.

• Staff provided technical assistance to a woven fabric manufacturer in Hong Kong to develop TOUGH COTTON™ technology on cotton/spandex twill fabrics for distribution in the U.S.

• Staff provided technical assistance to a leading Chinese textile company to develop TOUGH COTTON™ and STORM COTTON™ technologies for a Japanese clothing chain store.

• Staff provided technical assistance to two leading textile companies developing TOUGH COTTON™ technology for a U.S. workwear brand.
Nonwovens Marketing
The COVID-19 pandemic greatly affected the business and progress of the GSCM Nonwovens Team. COVID-19 has postponed important events such as INDEX and CIDPEX into late 2020 or into 2021. COVID-19 has hindered innovation development in additive manufacturing with a new commercial partner because “stay at home” orders eliminated access to labs and thus development came to a standstill. The inability to travel has halted face-to-face meetings, which hindered new development and the promotion of new innovations with cotton flock and composite developments. Through the COVID-19 pandemic, cotton continues to be front and center across core markets such as wipes, feminine hygiene, skin care, baby, and other hygiene products.

Many regional and global consumer brands licensed new nonwoven cotton products in the first half of 2020. Cotton containing product lines were licensed by brands in Russia, Poland, Germany, Mexico, Switzerland, Belgium, Brazil, Japan, South Korea, China, and the U.S. In the first half of 2020, there were 23 new trademark license programs: Seal of Cotton (5), cotton enhanced™ (10), and natural™ (8). The product markets include nonwoven roll goods, feminine hygiene tampons/pads/liners, wipes and skin care pads, baby diapers, filtration masks, and adult care pads.

As global manufacturing companies continue to ramp up development for the increased demand for naturally biodegradable materials, important innovative work is underway between multiple global partners and Cotton Incorporated to develop plastic free wipes substrates. As the E.U. (European Union) Single Use Plastics Directive continues to influence global brands’ product decisions, one key area of importance is in testing and certification. The GSCM Nonwovens Team is proactively submitting cotton to be tested by a leading testing lab to secure the necessary certifications to be deemed, “plastic free.” Vetting of testing labs is being performed in the first half of 2020 with testing and certification being conducted in the second half.

In the first half of 2020, the GSCM Nonwovens Marketing Team was actively involved in several aspects of marketing communications. Trade advertising in both print and digital continues to be an important and effective platform for promoting cotton across the global industry. A new advertising campaign for 2020 has been successfully rolled out. These print, digital, and animated advertisements highlight important industry issues such as sustainability, aquatic degradation, naturalness, and simplicity. An article of the results of a successful technical innovation using cotton flock was published in an industry leading publication in the first half of 2020. This type of work opens the door for input into trade publications that includes features on sustainability, natural products, global market research, raw materials, and various market segments. The June issue of this publication features cotton through various articles and product highlights. Brochures continue to be an important way to promote and highlight successful cotton projects. A new brochure on the hypoallergenic properties of cotton was developed and promoted through press releases and social media.

On the CottonWorks™ Website, four new technical lectures were developed and rolled out. These lectures included education and information on wipes technologies and end uses.

In support of the industry, staff continue to participate in seven key industry committees, chairing one global conference, and speaking at various industry engagements. Although the global pandemic has suspended, postponed, or virtualized industry events, the commitment to keep cotton at the forefront of the industry has not changed.

Fashion Marketing
With the world-wide catastrophic events of COVID-19 in the first half of 2020, fashion marketing activities experienced a complete shift in production and presentation. January saw staff working on the production of the Fall/Winter 2021/2022 season. The final production and editing were done from home offices and the presentation was launched virtually in April. Presentation, microsite, and materials all came out in the expected timeframe. Over a dozen presentations have been delivered to key companies.

While finishing production for the Fall/Winter 2021/2022 season, staff also started initial production for Denim 2021/2022 and Active 2022/2023. Staff created pre-views of the Denim and Active presentations which were launched in June. These presentations were viewed via webinars and virtual presentations with account executives, with multiple presentations scheduled throughout the summer. Full scale seasonal Spring/Summer 2022, Denim, and Active presentations are being researched and put together.

Staff created custom presentations for Latin America, Turkey, and Bangladesh. Staff also is shifting physical color cards into digital versions for the remainder of the year.

Fashion research was conducted both locally in New York and abroad. Research was conducted in Sydney, Wellington, Auckland, Berlin, Paris, Stockholm, and Barcelona. Staff worked with schools and universities both in the New York City office and virtually.

**Strategic Objective 3: Conduct technical education and training to support cotton use.**

The GSCM division manages the Importer Support Program (ISP), which provides programs that meet the mission of Cotton Incorporated and specifically benefit the importer segment of the supply chain. The CottonWorks™ site is the main marketing platform of the Global Supply Chain Division and is supported by the ISP program. The CottonWorks™ platform includes technical education workshops, webinars, education for emerging professionals, events such as the farm tours, and numerous other activities to increase and support the use of cotton in products.

Sixteen technical education workshops were held in the first six months of 2020 with over 530 attendees from nearly 100 major brands and retailers. Twelve of the 16 workshops were held virtually due to business closures and travel restrictions related to COVID-19. Staff moved quickly and efficiently to transition all workshops to a virtual platform. The purpose of these workshops was to provide detailed technical information and training on relevant topics important for cotton. The table below summarizes the information for those workshops.

<table>
<thead>
<tr>
<th>Workshop (Topic)</th>
<th>Workshop (Location)</th>
<th># of Companies</th>
<th># of Attendees</th>
<th>Overall Program Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denim Manufacturing &amp; Garment Finishing</td>
<td>Cary, NC</td>
<td>16</td>
<td>27</td>
<td>4.9</td>
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<tr>
<td>Meeting Product Development Specifications</td>
<td>San Francisco, CA</td>
<td>15</td>
<td>35</td>
<td>4.6</td>
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<tr>
<td>Printing Science</td>
<td>San Francisco, CA</td>
<td>17</td>
<td>40</td>
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<tr>
<td>Knit Design</td>
<td>San Francisco, CA</td>
<td>13</td>
<td>40</td>
<td>4.4</td>
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<tr>
<td>Denim Wet Processing</td>
<td>Virtual Workshop</td>
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<td>24</td>
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<tr>
<td>Color Science &amp; Color Measurement</td>
<td>Virtual Workshop</td>
<td>13</td>
<td>21</td>
<td>4.7</td>
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<tr>
<td>Sweater Manufacturing &amp; Design</td>
<td>Virtual Workshop</td>
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<td>Printing Science</td>
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<tr>
<td>Knit Design</td>
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<tr>
<td>Fiber &amp; Yarn Fundamentals</td>
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<tr>
<td>Knitting &amp; Weaving Fundamentals</td>
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<tr>
<td>Dyeing &amp; Finishing Fundamentals</td>
<td>Virtual Workshop</td>
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<td>41</td>
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<tr>
<td>Meeting Product Development Specifications</td>
<td>Virtual Workshop</td>
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<tr>
<td>Issues in Product Performance</td>
<td>Virtual Workshop</td>
<td>16</td>
<td>20</td>
<td>4.9</td>
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<tr>
<td>Introduction to Cotton</td>
<td>Virtual Workshop</td>
<td>22</td>
<td>39</td>
<td>4.8</td>
</tr>
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The CottonWorks™ Website is a marketing tool and educational resource (www.cottonworks.com). It is the leading innovative education and information resource for current and emerging textile industry professionals who are actively seeking connections to cotton. New content, both educational and marketing, continues to be added on a regular basis. In 2020, cotton fabrics from Cotton Incorporated’s FABRICAST™ library were digitized and added to the FABRICAST™ page, bringing the total number of digitally searchable fabrics to 1,041. Additionally, a small number of existing fabrics were divided into four categories as additional search criterion: Trending Fabrics, Denim Basics & Beyond, Natural & Sustainable, and Comfortable & Cozy. More categories are planned for 2020 to support recent trend forecasting and account connections. Staff also implemented a new section to the Website, Tariff Engineering, as well as new content to support recent webinars including Cotton Sustainability Basics and additional content in Biodegradability of Cotton. This year there were 35,062 registered users and 131,948 sessions.
CottonWorks™ webinars offer a unique way to reach the industry and amplify the Company’s message. In 2020, four webinars were held, including The Trade Dispute & U.S. Apparel Sourcing, Stop the Leak: Addressing Plastic Leakage in Your Supply Chain, and a two-part webinar series Cotton & Water. The Trade Dispute & U.S. Apparel Sourcing covered a timeline of recent tariffs and how those tariffs have impacted sourcing patterns. Over 398 individuals from more than 228 organizations registered for this event, with 191 individuals attending the live event. Stop the Leak: Addressing Plastic Leakage in Your Supply Chain discussed a new method to quantify the amount of plastic leakage from a product across the entire value chain. Over 581 individuals from more than 280 organizations registered for this event, with 369 individuals attending the live event. Our two-part webinar series, Cotton & Water, focused on the facts, the misconceptions, and the measurements around cotton and water. Part one, Cotton & Water: Demystifying Agricultural Water Management, examined science-based data behind cotton’s water use and discussed ongoing research that continues to improve cotton’s water productivity. More than 335 individuals from more than 186 organizations registered for this event, with 179 individuals attending the live event. Part two, Cotton & Water: Understanding Metrics & Use in Industry Tools, focused on how to measure, communicate, and benchmark water impacts and improvements. The webinar took a deeper look at the metrics used in life cycle assessment and examined industry tools like the Sustainable Apparel Coalition’s Higg Index. More than 407 individuals from 225 organizations registered for this event, with 196 individuals attending the live event. Webinars are one of the most successful methods to share information with many industry professionals from the global cotton industry.

The 2020 “Cotton in the Curriculum” university education program was initiated in January. Specifically, 23 university projects across the U.S. were awarded and begun. The objective of the university grants is to increase the awareness of cotton in the classrooms. In mid-March, all universities transitioned to online classes. Staff has worked closely with each grant recipient to adjust project proposals into the new digital format. Due to the COVID-19 travel restrictions, the 2020 “Educate the Educators” event has been cancelled. The request for proposals (RFP) for the 2021 calendar year has been posted.

Asia staff coordinated a special presentation for a major U.S. designer and marketer of children’s wear via the company’s intranet as part of their staff continued training and education. An informational presentation on economic, retail, and consumer insights was posted on the CottonWorks™ platform and linked to the customer’s intranet.
CONSUMER MARKETING COMMITTEE

ADVERTISING, PUBLIC RELATIONS, STRATEGIC ALLIANCES, AND CORPORATE STRATEGY & PROGRAM METRICS

Strategic Objective: Use advertising, public relations, and strategic alliances to build consumer demand and trade awareness for cotton and cotton products as well as use market intelligence to assess opportunities and threats for cotton, influence corporate strategy efforts, and leverage program metrics to evaluate and improve tactics for fulfilling Cotton Incorporated’s mission.

Advertising
Television
Comfort in Cotton was launched across TV and streaming services on April 20 and ran for a 5-week flight from April 20-May 23.

A total of 2.9K television exposures appeared across ABC, The CW, and FOX broadcast networks, and 10 cable networks (BET, Bravo, CMT, E!, Freeform, Food Network, HGTV, MTV, TLC, VH1). Units were scheduled during popular primetime programming such as The Masked Singer, 911, The Bachelor: Listen to Your Heart, Empire, The Last Man Standing, Dynasty, American Idol, Single Parents, Riverdale, Who Wants to be a Millionaire, Real Housewives, House Hunters, and Tyler Perry’s The Oval.

The commercials also ran on Roku and Hulu to extend the reach of the campaign to younger audiences who are either light TV viewers or do not have traditional cable subscriptions. The video buy delivered more than 6.9M impressions against women 18-34.

Digital Media
Rosie Reborn launched this past February as a Phase II of the Cotton Equals Denim campaign in the fourth quarter of 2019. The messaging captured the history of the Rosie the Riveter jumpsuit and Cotton’s collaboration with the clothing company, The GREAT. The campaign included top performing partners from the 2019 denim activity - Hulu, Tremor, and Videoamp – and generated 19M impressions and 16M video completes.

In response to the COVID-19 pandemic, and the stay at home order Cotton Incorporated (Cotton), along with a third-party agency, developed two new spots to encourage people to stay home and stay comfortable, Comfort In Cotton and Ode to Sweatpants (#sweatpantslife). Launching in mid-April, Comfort in Cotton ran across Hulu, Tremor, and Videoamp and Zefr was introduced to broaden reach and take advantage of engaged audiences online. This activity delivered 2.3M impressions and 1.6M video completes.

Lastly, an added value opportunity with BounceX launched in May, with the Ode to Sweatpants (#sweatpantslife) messaging, along with Zefr and delivered 832K impressions and 612K video completes.

The Cotton 2020 campaign, Life is Uncomfortable launched online in June, as the previous 2020 creative strategy Your Cotton Your Way was not able to be completed due to the pandemic’s impact on the production schedule. Amplifying the emotional connection between the consumer and the brand remains a strategic imperative. Overall, the objective for this campaign was to focus on educating consumers on the Cotton message, its relevancy, and why it should be the preferred fiber of choice.

Digital Media: Custom Content
This year’s Cotton campaign included a mix of data driven platforms and endemic partners, specific to fashion, health & wellness, and sustainability, in order to maximize reach and generate relevant content alignment across the target audience. Custom content programs are in the midst of being developed across an array of partners such as Buzzfeed, WhoWhatWear, etc. to promote upper funnel tactics such as brand awareness, favorability, and engagement. MindBodyGreen, Cotton’s primary sustainability-supporting partner, launched its first sponsored “Sustainable Sunday’s” Podcast with Chad Nelson on June 28 and in doing so, was able to generate 12K downloads within the first 24 hours. Additionally, Cotton’s Chief Sustainability Officer will join the podcast in the third quarter as a featured guest in addition to the scheduled advertising within the podcast.
Proven partners such as UrbanDaddy, Bustle, Spotify, and Undertone were brought back from last year’s campaign to assist Cotton in driving site engagement, while new partners such as Pandora, Verizon, and many more were brought on to test and garner new learnings for the brand. In totality, the campaign is slated to deliver 222M estimated impressions across connected TV devices, desktops, tablets, and mobile.

In terms of creative, the three health and wellness 15-second videos (Sleep, Irritation, & Underwear) along with the three sustainability videos (Plant, Flower vs. Oil, & Ocean) have been running in rotation across the plan. Banner ads for the health and wellness (Sheets, Women’s & Men’s Underwear) and the sustainability (Quality-In & Quality-Out) creatives along with native ad units, and other custom elements have been running in conjunction with the videos while driving users to TheFabricOfOurLives.com Website.

Paid Search Engine Marketing (SEM) and Organic Search (SEO)
Paid search advertising on Google and Bing continued to drive qualified visitors to TheFabricOfOurLives.com Website, accounting for 43% of traffic to the site. Thus far in 2020, SEM has driven 402K clicks and an impression reach of 5.64M. Of these clicks, 168K landed on cotton-rich products to the respective retailers’ e-commerce Websites via the Shop Cotton Web page, up 109% year-over-year. The top-performing paid search campaign continued to be Cotton Care with the highest click thru rate (CTR) at 19%, helping consumers in a time of need with cleaning and care tips. Keywords and ad copy were refreshed on all paid search campaigns for TheFabricOfOurLives.com, BlueJeansGoGreen.org, and CottonToday.com Websites as well as the implementation of the restructure plan to cater to the new Website.

Organic Search has driven 31% of traffic to TheFabricOfOurLives.com Website in 2020 to date. Audience analysis was conducted in February to validate audience segments and personas from the 2018 analysis and discover additional audience and interest segments to be explored for future campaigns. In March, SEM/SEO reports began to explore audience insights monthly, to inform paid search and paid social media, including the upcoming Know Your Clothes campaign.

TheFabricOfOurLives.com
There have been more than 703K visitors to TheFabricOfOurLives.com Website, year-to-date; driven largely by paid media efforts.

In January, the site launched with an updated layout, allowing users to use the site more efficiently to find information on cotton fabrics (a consistently searched question) as well as further developing the “Benefits of Cotton” section including updated and approved sustainability data.

The Department continued to write news articles (formerly blog posts) in the “Cotton News” section covering a range of fashion and lifestyle topics such as seasonal trends, wellness, and sustainability; always including corresponding cotton-rich shop items. Additionally, the Department focused an article on the Comfort in Cotton work with a link to the Center for Disease Control’s recommendation on how to make a homemade cotton face mask.

Shop Cotton items are seasonally appropriate with weekly curated products that may also correspond to current “Cotton News” articles.

Social Media
Paid social media was used to reach and engage with users across platforms such as Facebook, Instagram, and Pinterest. Messaging included Cotton program promotions, such as the Modern Rosies campaign, Comfort in Cotton, and Health & Wellness.

During the first half of 2020, social media campaigns promoted Modern Rosies from “Rosie Reborn,” Comfort in Cotton and Health & Wellness campaigns on Facebook, Instagram, and Pinterest (Health & Wellness only). The campaigns were optimized towards capturing attention and conveying complex messages and have already reached an estimated 16M unique users and garnered more than 106M impressions. To date, the campaigns have received over 341K engagements (likes, comments, shares, etc.). The Health & Wellness campaign will continue to run for the remainder of the summer.
Production

Production was completed on the *Rosie Reborn* campaign, which celebrated the resilience of the denim jumpsuit and the strength of the women (symbolized by fictional character Rosie the Riveter) who worked in male dominated industries to support their family and country during World War II. At the heart of the campaign is the denim jumpsuit, designed by female-owned company, The GREAT, which reimagines the jumpsuit for women who are breaking barriers today. Each jumpsuit (150 produced) incorporated a piece of denim from the 1940s as a reminder of denim’s durability and the women who made the fabric powerful in their actions. The campaign consisted of digital and social videos and still photography explaining cotton’s role in the denim jumpsuit and featured Modern Day Rosies (wearing the jumpsuit) in fields such as tech, architecture, welding, and professional sports to serve as a reminder to women everywhere to embrace their power and continue to break barriers. The campaign launched on February 19 on Cotton’s, The GREAT’s, and the Modern Day Rosie’s social channels. The campaign also received public relations support with interviews by three of the Modern Day Rosies on the *Today Show*, and editorial coverage from *Bustle*, *AdAge*, and other media sources. Digital components began February 24 to run on Hulu, Roku, and other digital partners.

Production began on the 2020 consumer campaign, *Your Cotton Your Way* which aims to highlight the comfort of cotton, the confidence it provides, and reinforcing The Fabric of Our Lives™ message. The campaign spotlights four individuals talking about their favorite cotton item while a pianist plays The Fabric of Our Lives™ jingle, which they sing together at the end. This production was postponed due to the pandemic and is intended to resume later in 2020. It is set to launch in 2021 on broadcast, digital, and social.

To respond to the current climate, in March and April 2020, the team quickly pivoted and production for *Comfort in Cotton* was completed for broadcast, digital, and social channels. This concept was born out of the stay-at-home order. The spot was meant to be a positive, hopeful snapshot of what life now looks like. It showcases beautiful moments in everyone’s life during these trying times, while tactfully drawing attention to the fact that wearing comfy, cozy cotton is the key to the “Stay Comfortable” portion of the tagline “Stay Home. Stay Safe. Stay Comfortable.”

Production was completed on updating the voice over and end card on the *Life is Uncomfortable*, “First Day” spot with the intent to run on broadcast and digital in 2020.

Production was completed on the *Know Your Clothes* and the Health & Wellness banners to run across the 2020 digital plan. The *Know Your Clothes* banners communicate the importance of knowing what your clothing is made of - that what goes on your body is just as important as what goes in it. The Health & Wellness banners communicate the health benefits of wearing cotton underwear to prevent infection and using cotton sheets for a cooler night’s sleep.

Production for *Ode to Sweatpants (#sweatpantslife)* was completed, which was a build-off of the *Comfort in Cotton* work as a nod to the current times of work-at-home/stay-at-home. The campaign featured roughly 15 videos that were posted on social media each day for one week, and all demonstrated different reasons consumers love cotton sweatpants. The digital assets were distributed across platforms and streamed on Hulu and Roku and made into a playlist on YouTube.

In June 2020, production began for the 2020 Instagram photoshoot meant to capture social content in a creative and cohesive look and feel. It will be uniquely suited for Instagram and deliver on the content pillars for social - Health & Wellness, Comfort, and Sustainability.

Youth Marketing

Advertising continued working with *Young Minds Inspired*, an educational site geared toward educators. In the first and second quarter of 2020, two e-blasts were sent to educators of 4th-8th graders across the country around STEM-focused learning in regard to the cotton lifecycle as it relates to fashion. As of May 2020, the program materials saw over 75K downloads.

Trade Media

A total of five macro trade print ads ran in the first half of 2020 in industry publications such as *Textile Insight*, *Ecotextile News*, and *Rivet*. The print campaign was complemented by digital banners on Websites such as *Ecotextile.com*, *WWD.com*, SourcingJournal.com, and *Rivet*. Messaging included a variety of topics such as the Seal of Cotton trademark adoption, denim, commodity analysis, sustainability, and textile innovation.
A total of 15 nonwovens-specific print ads ran in the first half of 2020 in publications such as Nonwovens Industry, Nonwovens Industry China, Nonwovens Industry South East Asia, Nonwovens Report International, Household Care & Personal Wipes, International Fiber Journal, and Sustainable Nonwovens. The print campaign was complemented by digital banner ads on Websites such as Nonwovens-Industry.com and SustainableNonwovens.net. Messaging focused on cotton benefits and sustainability.

A total of 23 cottonseed-specific print ads ran in the first half of 2020 in publications such as American Dairymen, Dairy Herd Management, Dairy Star, Feed & Grain Magazine, Progressive Dairyman, Farm & Dairy Magazine, Feedstuffs, Hoard’s Dairyman, and Milk. The cottonseed print campaign was complemented by digital banner ads on Websites such as AmericanDairymen.com, DairyHerd.com, Feedstuffs.com, and Hoards.com. Messaging focused on cottonseed’s price.

Three Cotton LEADS℠ specific print ads ran in the first half of 2020 in publications such as Ecotextile News. The print campaign was complemented by digital banner ads on Websites such as Ecotextile.com and SourcingJournal.com. Messaging focused on sustainability, science, and leadership.

Corporate Communications
Support of Consumer Programs
Corporate Communications supported key consumer-facing projects in the first half of 2020, including the Blue Jeans Go Green™ (BJGG) denim recycling program, as well as ongoing support of advertising campaigns and initiatives.

In support of the BJGG program, the department has increased the frequency of posts on the corporate-facing social media channels and helped review press releases and material assets. To date in 2020, posts about the program have organically reached approximately 40K people across the channels.

While several initiatives for the BJGG program have been put on hold due to the COVID-19 pandemic, the Corporate Communications department continues to work with the Brand Partnerships department to develop and review collateral and content for future campaigns and initiatives in the second half of the year.

Corporate Communications worked closely with the Advertising department to launch and promote the Rosie Reborn campaign in February. Working closely with Advertising and third-party agencies, Corporate Communications reviewed ideas, designs, campaign videos, as well as worked on developing media pitches and securing coverage.

The department also supported the Comfort in Cotton advertising campaign that was created to reflect the “stay at home” nature of the COVID-19 pandemic. The video for the digital campaign was shared across the corporate social media channels and inspired the creation of two additional videos, produced in-house, to help support the comfort messaging.

Trade Programs
Two notable media sponsorships in the first half of 2020 were the Denim Look Book and Circularity Survey & Report. The Denim Look Book, in collaboration with Rivet, filled the void of canceled denim trade shows by allowing denim designers a showcase for their work. Since June 17, the showcase has garnered more than 2K global views and will continue to be promoted through social media and dedicated e-blasts. The Circularity Survey & Report was an industry-facing survey designed to better comprehend the disparate definitions and approach to circularity. The report based on the responses was published to the Sourcing Journal site, and a webinar based upon the results will take place on July 28. Full metrics will be received and reported after the webinar in late June.

In China, the department launched three media partner programs, including the year-long China International Fabric Design Competition; an in-store Seal of Cotton trademark promotion with a major Chinese licensee; and the monthly Shanghai Mart Workshops. In addition, the department began sponsoring a denim-focused textile education platform called I-SKOOL. At the time of this report, first half year metrics were still being compiled, but a complete accounting will be made in the full-year report.

Sustainability
The department sponsored an update to the Eco Textile News booklet, The Insider Guide to Cotton & Sustainability. Released in January 2020, the sponsorship underscores the Company’s commitment to and authority in cotton sustainability.
The department worked closely with the Sustainability department to update and redesign existing fact sheets on key cotton topics such as pesticides, water, land use, and comparison of organic and conventional production systems.

In April, the department deployed six “graphically enhanced media” (GEM) units across the corporate social media channels. These GEMs feature the Chief Sustainability Officer at Cotton Incorporated, as spokesperson. Although evergreen content, they were featured as a weekly series on the corporate social media channels leading up to Earth Day in April. Across all three platforms (Facebook, LinkedIn, and Twitter), the videos garnered a reach of over 25K and have been viewed over 5.4K times.

Related to sustainability, the department has produced a new full-length “Cotton & Comfort” animation, which has been broken down into three vignettes showcasing the versatility of cotton – clothing, food, and shelter. The vignettes have started to be shared across the corporate social media channels and will continue to be distributed into the second half of the year, followed by the full-length video. The video is also showcased on the Cotton Today Website.

The department also continued to work in concert with the Sustainability department, National Cotton Council, and Cotton Council International to support and promote the U.S. Cotton Trust Protocol.

**Cotton Incorporated Lifestyle Monitor™ Survey**

The *Lifestyle Monitor™* survey and other data resources within continue to attract interest in the media, as well as the industry. Corporate Communications continues to work closely with the Corporate Strategy & Insights (CSI) department to promote all the analytical resources of the company, and to integrate these data to support the direction of the company’s cotton-promoting programs.

The *Lifestyle Monitor™* articles continue to remain a popular feature in the *Sourcing Journal* and in the denim-centric *Rivet* (as appropriate), where the articles are frequently the top reads of the week. Some of the most popular articles were about the evolution of denim, fashion designers embracing sustainability, and shopping for apparel during the COVID-19 pandemic.

Corporate Communications has also shared data and infographics about special surveys conducted by the CSI department. Special surveys were conducted about home textiles in the U.S., China, and Mexico, and two waves of surveys about consumers and COVID-19 were also conducted in the U.S., China, and Mexico. These results were shared on the *Lifestyle Monitor™* Website and shared across all the corporate social media platforms.

The department continued its editorial partnership with the Robin Report in 2020 with articles promoting the *Lifestyle Monitor™* survey and other analyses from CSI, as well as on cotton sustainability.

**Social Media**

The department has also focused on organically growing their social media presence (separate from the consumer-facing “Discover Cotton” pages). From January 1, 2020 through June 30, 2020, the corporate Facebook page grew from 11,594 followers to 11,777. This number of followers may appear small, especially relative to the consumer Facebook page, which has close to one million followers. However, given the smaller size of the trade/corporate audience, the number of followers is quite good.

Video and animated posts have continued to perform significantly higher than static image posts. During the first and second quarters, videos posted to the Facebook page garnered approximately 19.2K video views and a viewing total of 6.3K. The top videos during this time were: *Rosie Reborn* (11,034 total reach; video posted two times), *Comfort in Cotton – Thank You* (3,150 total reach), and the *Comfort in Cotton* ad campaign video (2,074 total reach).

The department continues to utilize Twitter and LinkedIn as social media tools, sharing articles and information pertinent to the cotton agricultural and textile industries – press releases, webinars, environmental videos, etc. While LinkedIn is still primarily for industry-related information, the department has found that posting more consumer-friendly information on the page has been beneficial and engagement and followers have increased. The corporate Twitter page now has 5,776 total followers, and the LinkedIn corporate page now has 15,101 followers.
The department has also increased promotion of the CottonWorks™ Website and FABRICAST™ collections across the social channels. The posts do particularly well on LinkedIn but receive great engagement across all the channels. While the posts have been shared all year, the direction of the posts and fabrics changed to reflect more “cozy” fabrics that were good for “staying at home” during the COVID-19 pandemic.

As part of the promotion of the 50th Anniversary of Cotton Incorporated, the department has created over 50 social cards featuring interesting facts about Cotton Incorporated and the cotton industry in general. The cards feature the 50th Anniversary, “50 Years Forward” logo and are shared weekly on Sundays. To date, the anniversary social cards have had over 90K impressions across all three channels.

At the beginning of 2020, Corporate Communications also began a subscription to a social media tool that assists in scheduling posts across channels, reaching the right audiences on each channel, and also getting metrics on posts and campaigns.

**Cottonseed Marketing**

Both wholeseed and cottonseed oil programs for 2020 were significantly impacted by the COVID-19 pandemic, which led to the cancellation of all scheduled events for the year, but progress was made in both areas. In wholeseed, a new print ad was released with digital components, an advisory board representative of target audiences was assembled, and two quarterly meetings occurred. In addition, promising independent research on the use of wholeseed for beef cattle has spurred additional knowledge gap research that is currently in process.

For cottonseed oil, a consumer-facing Website was developed and is expected to launch later this year. In addition, a curriculum for target audiences is being developed. This is will help fill knowledge gaps about both the health and performance benefits of cottonseed oil. This curriculum will now be delivered remotely, in light of the cancellation of in-person educational conferences.

**Brand Partnerships**

**Consumer Sustainability Initiative: Blue Jeans Go Green™ Program**

Throughout the first half of the year, the Blue Jeans Go Green™ (BJGG) denim recycling program continued to work with a variety of brands and retailers that are committed to cotton sustainability through recycling denim. Participants included American Eagle, Ariat, Garage, Levi’s, Madewell, O.N.S., rag & bone, and Zappos. The BJGG program also welcomed online retailer, Industry Standard, to the program on April 22. All retailers offered incentives to their customers in-store (when open) and online to recycle denim made from cotton and close the loop by keeping textile waste out of landfills. On April 23, Madewell, a participant in the program since 2014, announced that they contributed over 1M pieces of denim to the BJGG program. As a result of all participants’ efforts and despite shelter in place orders, approximately 200,000 lbs. of denim have been contributed for recycling during the first half of 2020.

In April, to celebrate the 50th anniversary of Earth Day, the Blue Jeans Go Green™ program launched a special video series to educate followers on how they could “Do Good on Earth Day,” by wearing natural, durable, and recyclable denim made from cotton. The video series kicked-off on April 19, with a video a day being featured across @DiscoverCotton social accounts. On Earth Day, April 22, the full-length Earth Day video from Cotton’s Blue Jeans Go Green™ program was featured on BlueJeansGoGreen.org, @DiscoverCotton consumer social accounts, and Cotton Incorporated’s corporate social channels.

While distribution was paused March through June as a result of the COVID-19 pandemic, during the first quarter, UltraTouch™ Denim Insulation was distributed to grant recipients and Habitat for Humanity affiliates; some of which include Wake County (NC) and Baton Rouge and New Orleans (LA).

**Strategic and Retail Partnerships**

Due to the impact the pandemic had on the retail industry, the retail programming, and events that Brand Partnerships originally had planned for the first half of the year were postponed to the second half of 2020. As a result, the team has been working on alternative plans for retail programs with Amazon, Saks, and online retailer, REVOLVE. Most activities developed for brick-and-mortar and/or point-of-sale have been restructured to be virtual experiences with the exception of in-store cotton displays (“shop-in-shops”) that will launch at ten Saks Fifth Avenue stores across the country in October.
Corporate Strategy & Program Metrics

Market Intelligence
This area encompasses ongoing research studies that assist Cotton Incorporated in monitoring the supply chain for changes in cotton use and/or market perceptions.

Lifestyle Monitor™ Survey
Recent research results will be used to better understand the attitudes of U.S. consumers toward cotton and competitive fibers, online shopping, sustainability, microfiber pollution awareness, denim jeans, and shopping preferences. In the first half of 2020, subject areas of research in the Lifestyle Monitor™ survey included, but were not limited to:

- Cotton Perceptions: The majority of consumers say cotton clothing is the most sustainable (81%), highest quality (73%), and lasts the longest (66%) compared to manmade fiber clothing.
- Online Shopping: Although the majority of consumers prefer to research clothing (65%), browse (54%), and repurchase (52%) clothing online, most still prefer the remainder of their apparel shopping journey - pre-purchase questions (64%), purchasing (69%), and post-purchase questions (50%) - to occur in a physical store.
- Microfiber pollution awareness: Nearly a third of consumers (30%), up from 17% in 2018, say they are aware of the concerns that microfibers from clothing are polluting our oceans and waters. Three-fourths of consumers (75%), who are aware of microfiber pollution, say that awareness will affect their future clothing purchase decisions.
- Denim Jeans: On average, U.S. consumers own six pairs of denim jeans. Six out of ten consumers (60%) say they wear denim jeans or shorts at least three times a week. Nearly two-thirds of consumers (63%) say they prefer their denim be made of 100% cotton or cotton with stretch.
- Circular Fashion: Only one in four consumers (25%) say they have heard of circular fashion in the clothing industry. However, three-fourths of consumers (75%) say they are interested in the fashion industry becoming more circular.

Retail Monitor™ Research
Retail Monitor™ research is used to better understand cotton’s presence as well as the opportunities and challenges for cotton in major adult apparel categories offered at retail in the U.S. Below are highlights from the first quarter 2020 results.

- Womenswear: Cotton’s share (weight basis) increased in five of the six major womenswear categories: knit shirts (+4.9 percentage points), denim jeans (+1.9 percentage points), athletic apparel (+1.2 percentage points), woven shirts (+0.6 percentage points), and pants (+0.1 percentage points). Increases in cotton’s share of women’s athletic apparel were driven by increases in women’s athletic tops (+4.1 percentage points) while share in women’s athletic bottoms declined (-1.8 percentage points).
- Menswear: Cotton’s share (weight basis) increased in three of the five major menswear categories: athletic apparel (+5.1 percentage points), denim jeans (+0.6 percentage points), and knit shirts (+0.1 percentage points). Increases in cotton’s share of men’s athletic apparel were driven by increases in both athletic tops (+5.6 percentage points) and athletic bottoms (+4.3 percentage points).

Census-Based Import Database
Staff established a database to track monthly apparel imports by source country. This enabled analysis of changes in sourcing patterns under apparel tariffs enacted in September 2019.

Marketing Mix Model
A marketing mix model analysis was conducted in the beginning of the year to assess the combination of marketing and promotional efforts that would provide the best return on investment and garner the most exposure for cotton. Results indicated TV provides a solid base, while digital provides the best return for the marginal dollar. Collectively, marketing is estimated to drive 23% of cotton’s market share.

Corporate Strategy
This area involves the analysis and dissemination of the market intelligence that has been collected through both proprietary and secondary research studies. This information is used to drive internal and external strategies.
Industry Presentations and Meetings
During the first half of 2020, staff executed 27 presentations and meetings on fiber economics and market research with key global industry contacts, which included delivering domestic and global market intelligence presentations in the U.S. as well as virtually to Latin American and Asian audiences via webinars and recorded presentations. Key topics included the cotton economic outlook and response to the COVID-19 pandemic along with consumer behavioral shifts in shopping for clothes due to the pandemic and sheltering in place, sustainability, home textiles, children’s apparel, and retail trend updates. Together the economic and market research presentations had over 2K attendees. Below are a few highlights:

- Staff presented two economic presentations at the Beltwide Cotton Conferences. These included a research talk on the relationship between USDA condition and progress data and yield as well as a cotton market outlook talk at an engineering session.
- A presentation on the cotton market outlook was presented to a group of Alabama growers.
- Economics webinar discussing the effect of tariffs on sourcing patterns was presented on the CottonWorks™ platform.
- Due to the pandemic, an extended trip through Latin America was not possible. As a replacement, staff prepared presentations covering the cotton market situation and how it has been affected by the pandemic.
- Staff presented to almost 300 attendees at the Georgia Cotton Producers’ Annual Meeting and the Ag Outlook Forum on the efforts of Cotton Incorporated’s Consumer Marketing division to help build demand for cotton.
- Staff provided a recorded Consumer and Retail Insights presentation for use in the Chinese domestic market as well as a live webinar for the Hong Kong market. Account Executives in China used the market research presentations for multiple webinars in the domestic market reaching over 10K viewers.
- A virtual presentation on the Mexican Children’s Apparel Market was recorded by staff and viewed by over 700 unique visitors.

Economic Publications
The Corporate Strategy & Insights staff continually tracks cotton fundamentals and prices throughout the supply chain. Analysis of the cotton market is published and presented in a variety of formats:

- Six issues of the Monthly Economic Letter were published to inform participants in the cotton supply chain about developments in the cotton market in order to help them make better and more profitable decisions.
- Six issues of the Executive Cotton Update, which focus on the U.S. economy and is designed as a tool to inform clients about how changes in the U.S. economy might affect the cotton supply chain, were published.
- Six reports about how changes in cotton prices are “passed through” the supply chain were published and distributed.
- Staff provided weekly radio updates on the cotton market. These Weekly Cotton Market Updates are posted on the Cotton Board Website and distributed to nearly 50 different radio stations across the nation.
- Staff provided weekly television interviews to RFD-TV, which garners 11M impressions weekly from a viewership of 45M subscribers. An Agricultural Resource Management study revealed that RFD-TV is the number one source of information for farmers and ranchers.

Market Research Publications & Supply Chain Insights
Supply Chain Insights:

- COVID-19. Based on the results of Waves 1 and 2 of the 2020 Coronavirus Consumer Response Survey, 7 infographics were created and disseminated to key accounts and retailers and made available on Cotton Incorporated’s Website. Key findings show high personal concern for the COVID-19 pandemic and pent-up demand for clothing, as consumers wait for the crisis to pass before purchasing new clothing.

- Home Textiles. Based on the results of the 2020 Home Textiles Survey, three infographics were created and disseminated to key accounts and retailers and made available on Cotton Incorporated’s Website. Key findings show the importance of cotton in conjunction with key attributes of quality, comfort, softness, and durability for consumers in the U.S., China, and Mexico.
• **Baby Care.** Based on the results of the 2018 Baby Care Study, one infographic was created and disseminated to key accounts and made available on Cotton Incorporated’s Website. Key findings show parental anxiety about how to best raise their children, with cotton standing out as a trusted fiber that they want to see in diapers and wipes for their babies.

**Lifestyle Monitor™ email.** In collaboration with the Corporate Communications department, emails with trending topics from recent *Lifestyle Monitor™* research are disseminated monthly via email to direct traffic to [LifestyleMonitor.CottonInc.com](http://LifestyleMonitor.CottonInc.com).

**Strategic Research and Program Metrics**

The Strategic Research projects enhance knowledge in areas that are critical for cotton opportunities or challenges as well as help measure corporate efforts to support the Company’s mission. The Chinese Consumer Survey and Chinese Retail Audit are ongoing market research studies conducted jointly by Cotton Council International and CSI. The latest findings from these projects as well as additional results from other strategic research studies are provided.

**COVID-19 Research**

CSI conducted two waves of a survey on consumers’ responses to the COVID-19 pandemic. The first wave was conducted in March with 2K consumers in the U.S., China, Mexico, and Italy, while the second was conducted in May with 1.5K consumers in the U.S., China, and Mexico. Highlights from the results include:

- The percentage of consumers in all countries who were very concerned about the pandemic grew from Wave 1 to Wave 2, with the highest jump in Mexico, from 55% to 65%.
- Most (80%) consumers are limiting their spending now, but are looking forward to shopping in the future, as 83% say they plan to purchase clothing in the next three months.
- Nearly half (47%) of consumers say they are more concerned now about the safety of their clothing, and 84% believe that cotton in clothing is a safe fiber.

**Home Textiles Research**

CSI conducted a survey of consumer attitudes about home textiles among 6K consumers in the U.S., U.K., Mexico, Colombia, China, India, Vietnam, Thailand, Japan, Germany, and Italy in order to understand consumers’ attitudes, purchase drivers, and shopping behaviors for bath towels, sheets, bedding, and blankets. Highlights from the results include:

- Most consumers (80%) believe quality sheets and bedding help you sleep better, and quality is the top purchase driver for bath towels (82%), sheets (83%), and bedding (83%). Quality is also the top reason consumers say that fiber content is important to them when choosing home textiles.
- Consumers on average experience fewer negative issues such as fading, fabric thinning, or roughness when they purchase 100% cotton home textiles, compared to manmade fibers or blends.

**Chinese Consumer Survey**

Below are highlights from the most recent results:

- **Apparel Shopping:** Chinese consumers say they buy most of their clothing from chain stores (25%), followed by ecommerce platforms (22%), department stores (20%), small independent shops (12%), and hyper-markets (9%).
- **Clothing purchase factors:** Over three-fourths of Chinese shoppers say fit (88%), style (85%), finishing (82%), fiber content (80%), color (78%), price (78%), and durability (77%) are the most important factors when considering what clothing to purchase.
- **Clothing ideas:** Chinese consumers are most likely to get their clothing ideas from what they already own and like (53%), followed by friends and people they see regularly (38%), celebrities (36%), social media sites (34%), store fliers (18%), and in-store displays (13%).
Chinese Retail Audit
Below are highlights from the most recent results:

- Cotton's share (weight basis) of major menswear product categories audited in Shanghai and Xi'an, China stood at 74% in 2020, up slightly from 2019 (72%).
- Over the past year, cotton’s share increased for men’s jeans (88%, up from 84%), knit tops (80%, up from 77%), woven tops (83%, up from 80%), and activewear (53%, up from 50%).
- Cotton’s share (weight basis) of major womenswear product categories was 61% in 2020, up slightly from 58% in 2019, with increases in cotton’s share of women’s denim jeans (89%, up from 85%), pants (45% up from 34%), and activewear (41% from 38%).

Brand Tracker
In the first half of 2020, 3.8K U.S. respondents were interviewed regarding their awareness and attitudes toward cotton and competitive fibers. The information provides insight into changing emotions toward fibers and shows that promotions are meeting objectives by maintaining cotton’s significant lead in fiber awareness and emotional connection. The most recent results available from the first quarter indicate consumers’ emotional connection to the fiber remains exceptionally strong with nine-in-ten saying they love (53%) or like (37%) cotton. Key brand metrics show cotton continues to lead competitive fibers in awareness (86% unaided, 97% aided) and a significantly larger share of respondents consider cotton to be comfortable (84%) and a fiber they like to wear (82%). Three-fifths of consumers say they usually or always look at fabric content labels, representing a significant increase versus last year (55%).
APPENDIX A: MEDIA OUTREACH COVERAGE

Generating press releases about noteworthy activities and accomplishments, as well as sharing information with the media, remain extremely successful means of securing press coverage. These proactive and reactive communications draw upon the knowledge of in-house experts and the full range of data and analyses generated by the company. The following communications were disseminated in the first half of 2020.

**Trade**

<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 26, 2020</td>
<td><em>2019 Cotton Biotechnology Award Recipient – Dr. Baohong Zhang</em></td>
</tr>
<tr>
<td>March 25, 2020</td>
<td>Cotton &amp; COVID-19</td>
</tr>
<tr>
<td>April 29, 2020</td>
<td>Cotton Incorporated releases new lectures on fast-paced wipes market</td>
</tr>
</tbody>
</table>

**Consumer**

<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 19, 2020</td>
<td>Empowering Strength and Enduring Style: “Rosie Reborn” Campaign Celebrates Female Trailblazers</td>
</tr>
</tbody>
</table>

**Television and Radio Coverage**

The following is a partial list of Cotton Incorporated’s television and radio coverage in the first two quarters of 2020.

<table>
<thead>
<tr>
<th>Station</th>
<th>Affiliate</th>
<th>Market</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today Show</td>
<td>NBC</td>
<td>New York</td>
<td>Coverage of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>RFD-TV</td>
<td>United States</td>
<td></td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>FM News 101 KXL</td>
<td>ABC</td>
<td>South Carolina</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>ABC 27</td>
<td>Harrisburg, PA</td>
<td></td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>WTAJ-TV</td>
<td>CBS</td>
<td>West-Central,</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pennsylvania</td>
<td></td>
</tr>
<tr>
<td>KTLA-LA (WB)</td>
<td>CBS/FOX</td>
<td>Los Angeles, CA</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>WAAY-TV</td>
<td>ABC</td>
<td>Huntsville, Alabama</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>KPVI</td>
<td>NBC</td>
<td>Pocatello, Idaho</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>WBBM Newsradio 780</td>
<td>NBC</td>
<td>Chicago, IL</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>KTAB (CBS)</td>
<td>CBS/Telemundo</td>
<td>Abilene, TX</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>KQRE</td>
<td>CBS/FOX</td>
<td>Albuquerque, NM</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>KSN</td>
<td>NBC/Telemundo</td>
<td>Wichita, KS</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
</tbody>
</table>
Internet Coverage
The following is a partial list of the online mentions of Cotton Incorporated, or its initiatives or programs, in the first two quarters of 2020.

<table>
<thead>
<tr>
<th>Publication</th>
<th>Mention of Cotton Incorporated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton Farming</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Darling Magazine</td>
<td>Mention of the Blue Jeans Go Green™ program</td>
</tr>
<tr>
<td>Cotton Grower</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Textile World</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Southeast Farm Press</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>The Washington Post</td>
<td>Mention of the Blue Jeans Go Green™ program</td>
</tr>
<tr>
<td>Her Campus</td>
<td>Mention of the Blue Jeans Go Green™ program</td>
</tr>
<tr>
<td>Delta Farm Press</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Ad Age</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>New York Latino News</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>Women’s Wear Daily</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Bustle</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>Forbes</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>Corn and Soybean Digest</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Los Angeles Times</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td>ecotextile.com</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td><a href="http://www.just-style.com">www.just-style.com</a></td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Star-Gazette</td>
<td>Mention of “Rosie Reborn” campaign</td>
</tr>
<tr>
<td><a href="http://www.fibre2fashion.com">www.fibre2fashion.com</a></td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Oklahoma Farm Report</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>University Chronicle</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Madison Mom</td>
<td>Mention of the Blue Jeans Go Green™ program</td>
</tr>
<tr>
<td>Arizona Daily Star</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>rockpaperglam.com</td>
<td>Mention of the Blue Jeans Go Green™ program</td>
</tr>
<tr>
<td>Manhattanweek</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>textile-future.com</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>TheWorldSeeds.com</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Nonwoven Industry</td>
<td>Mention of Cotton Incorporated</td>
</tr>
<tr>
<td>Home Textiles Today</td>
<td>Mention of Cotton Incorporated</td>
</tr>
</tbody>
</table>
The Corporate Administration Division includes Board of Director Services, Human Resources, Corporate Office and Facility Services, and Intellectual Property, Contracts and Legal Departments.

The Corporate Finance Division is comprised of Corporate Finance, Treasury & Investment Services, and Accounting.

New Board Members participated in a new Board Orientation meeting, which included a Multi-Region Producer Tour on February 10, a tour of the World Headquarters in Cary, NC, and presentations by staff and representatives from the Cotton Board. The second day of the Orientation focused on specific topics related to the Board of Directors, such as USDA oversight of the Program, Accounting procedures, an overview of the Board structure, and training for the dedicated Board of Directors Website.

The Board held an Executive Committee Meeting in Nashville, TN, March 2-4, with a Cotton Board Board meeting. The Cotton Incorporated Executive Committee participated in many of the Cotton Board sessions, including Program Committee meetings, the General Session, and the Business Session.

The Officers of Cotton Incorporated and the Cotton Board held a joint Board Strategic Planning Session on April 1 via WebEx Conference. Topics of discussion included 2020 budget execution, 2020 meeting schedule options, the Cotton Board’s Program Recommendations for 2021, medium-term funding, longer-term funding, personnel, and key programmatic directions.

In addition, the Cotton Incorporated Board of Directors held a Directors Meeting June 11-13, via WebEx Conference, in conjunction with Cotton Board Members. The key objectives of the meeting were for management, staff, and Board Officers to:

- Provide Updates on 2020 Program Activities
- Present 2021 Budget Framework for Discussion and Board Recommendation
- Present 2019 Actual-to-Budget Report
- Provide a Response to the Cotton Board’s Program Recommendations

### COTTON INCORPORATED
### BUDGET DATA THROUGH JUNE 30, 2020

<table>
<thead>
<tr>
<th>Program Area Expenditures</th>
<th>Budget</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Research</td>
<td>$16,009,000</td>
<td>$2,496,375</td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➢ Fiber Competition</td>
<td>$5,068,000</td>
<td>$1,948,858</td>
</tr>
<tr>
<td>➢ Product Development &amp; Implementation</td>
<td>$10,145,000</td>
<td>$4,015,437</td>
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<tr>
<td></td>
<td><strong>$15,213,000</strong></td>
<td><strong>$5,964,295</strong></td>
</tr>
<tr>
<td>Global Supply Chain Marketing</td>
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<td>$7,083,010</td>
</tr>
<tr>
<td>Consumer Marketing</td>
<td>$34,707,000</td>
<td>$14,287,140</td>
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<tr>
<td>Corporate Administration</td>
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<td>$3,789,682</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>$88,320,000</strong></td>
<td><strong>$32,620,502</strong></td>
</tr>
</tbody>
</table>
EXPLANATION OF TERMS AND ACTIVITIES

Agricultural Research Committee

Cottonseed Marketing – The objective of this activity is to increase the value of cottonseed at the grower level through strategic, targeted marketing using print and radio advertising, trade shows, direct mail, and publicity (press releases and feature articles).

Cottonseed Research – The objective of this research is to eliminate the barriers to cottonseed usage. Activities include research to eliminate gossypol; testing the cottonseed nutrient profile to determine natural variation in germplasm and evaluating this germplasm for adding value and reducing input potential; and developing new products and utilizing advances with low-gossypol cottonseed products.

Disease Management – The minimization of plant pathogens as significant economically damaging pests in cotton production.

Insect Pest Management – The objectives of this activity are twofold: (1) Develop management recommendations for insect pests that meet the needs of a changing farm landscape using integrated pest management (IPM) strategies, and (2) Support boll weevil and pink bollworm eradication programs with research and technical expertise.

Weed Management – The minimization of weeds as significant, economically damaging pests in cotton production.

Research and Development Committee

Fiber Competition

Cotton Communicator Software™ – Provides merchants and gins options to create Electronic Data Interchange (EDI) files from three different input file types and uses the data to create EDI files in a format that when sent to cotton mills is easily imported into EFS® System MILLNet™ programs and databases using a third-party EDI import program.

Cotton Management System (CMS) – The Cotton Management System is a group of related software programs, including legacy applications such as the EFS® MILLNet™ System software, designed to work independently and cooperatively to manage cotton as a raw material and asset. By providing tools to manage most aspects of cotton's life cycle, CMS seeks to improve the efficiency of cotton flow, increase the efficiency and use of cotton, boost the profitability of cotton, and increase the demand for cotton.

EFS®-USCROP™ Software – Enables a user to review and analyze crop data using USDA high volume instrument classing information. Recap and Discount Premium reports are enhanced with a host of graphs and charts.

Engineered Fiber Selection® (EFS®) System MILLNet™ Software – Manages a mill's acquisition and use of USDA high volume instrument-classed cotton. Integrated programs create transparency for the different departments within the mill.

Product Evaluation Laboratory – The objective of this activity is to provide accurate, reliable, and unbiased test data on fiber, yarn, fabric, and products from Cotton Incorporated's research-to-marketing efforts and breeder initiatives to increase the global demand and use of U.S. Upland cotton.

Software Development and Maintenance – The objective of this activity is to plan and execute the development of new software products for managing and improving the efficiency of cotton as a raw material, asset, and commodity. The Product Development group services and adapts the existing software products that are in the growth and maturity stages of the product lifecycle.

Software Service and Marketing – The objective of the service activity is to provide high-quality customer service that is critical to the success of the efforts to increase cotton competitiveness through innovative cotton management software. This is accomplished by providing EFS® System users with the documentation and customer service support that enables them to use the products efficiently. Frequent customer contact builds relationships with existing customers and helps gather feedback on the product to guide product maintenance and new product development. The objective of the marketing activity is to develop a competitive advantage for cotton by defining potential markets for the EFS® System and researching potential customers for
current products in the CMS family. This area communicates EFS® System benefits to potential licensees. By maintaining a high level of customer contact, this group works with all segments of the EFS® System product lifecycle by providing information for the maintenance of established products and developing product requirements for future projects.

**Quality Measurements Improvement** – The objective of this activity is to provide better tools, measurement systems, and data analysis techniques to improve quality measurements of cotton fiber, yarn, and fabric.

**Product Development and Implementation**

**Acrylonitrile Butadiene Styrene (ABS):** Is a common thermoplastic polymer that is amorphous and, therefore, has no true melting point. The most important mechanical properties of ABS are impact resistance and toughness. Fibers and additives can be mixed with ABS to make the final product stronger and raise its maximum operating temperature as high as 176°F.

**Agricultural and Environmental Research (AER):** A team of scientists that provide research and technical services to cotton growers, ginners, and their support industries. The department is also a link between cotton production, the textile industry, and the research and extension communities.

**Differential Scanning Calorimetry (DSC):** Is a thermoanalytical technique in which the difference in the amount of heat required to increase the temperature of a sample and reference is measured as a function of temperature.

**Dimethylol Dihydroxy Ethylene Urea (DMDHEU):** An organic compound used for treating cellulose-based heavy fabrics to inhibit wrinkle formation. Most commonly used in durable press finishes as a non-formaldehyde binder because of its relatively low cost.

**Dyeing and Finishing Applications Laboratory (DFAL):** This laboratory contains both production scale and lab scale equipment used for internal projects and for industry implementation trials. The machinery allows the application of dyes on textiles and mechanical and chemical finishes.

**Engineered Fiber Selection® (EFS®) Technical Service Group:** The objective of this group is to plan and execute the development of new software products for managing a mill’s acquisition and use of USDA high volume instrumentation – classed cotton.

**FABRICAST™ Collection:** This is a collection of knit and woven fabrics used to provide the industry with direction and inspiration for product development. The fabrics also strategically market cotton performance technologies.

**Fiber Competition (FC):** A team of scientists dedicated to providing accurate, reliable, and unbiased test data on fiber, yarn, fabrics, and products from Cotton Incorporated’s research-to-marketing efforts and breeder initiatives to increase the global demand and use of U.S. Upland cotton.

**Fiber Processing (FP):** A team of scientists dedicated to converting cotton fiber efficiently into yarn that will meet industry specifications, provide technical assistance, and develop innovative yarns.

**Fiber Processing Laboratory (FPL):** This laboratory contains opening, cleaning, carding, and spinning equipment for yarn manufacturing.

**Hand:** The tactile sensations or impressions, which arise when fabrics are touched, squeezed, rubbed, or otherwise handled.

**Home Laundry Test Data (HLTD):** A data set developed by AATCC Committee RA88, Home Laundering Technology, established to develop a consistent set of test conditions for all test methods involving home laundering.

**Industry Associations:** Cotton Incorporated maintains a presence and membership in several leading industry associations. 3D.RC – 3D Retail Coalition. A consensus-based group, working together to advance 3D technology for designers, retailers, manufacturers, and supply chains in apparel, accessories, and footwear.

AATCC – American Association of Textile Chemists and Colorists
ASTM International – consensus-based standards organization, committee D13 covers most textile standards
SAC – Sustainable Apparel Coalition

**Life Cycle Assessment (LCA):** A technique to assess environmental impacts associated with all the stages of a product’s life (i.e. from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).

**Phase Change Material (PCM):** A substance with a high heat of fusion, which melts, and solidifies at a certain temperature, can store, and release large amounts of energy. Heat is absorbed or released when the material changes from solid to liquid and vice versa; thus, PCMs are classified as latent heat storage (LHS) units.

**Polyactic Acid or Polylactide (PLA):** A thermoplastic aliphatic polyester derived from renewable biomass, typically from fermented plant starch such as from corn, cassava, sugarcane, or sugar beet pulp. In 2010, PLA had the second highest consumption volume of any bioplastic in the world.

**Polypropylene (PP):** A thermoplastic polymer used in a wide variety of applications. It is produced via chain-growth polymerization from monomer propylene. It belongs to the group of polyolefins and is partially crystalline and non-polar.

**Product Development (PD):** A team of dedicated scientists and designers that provide the cotton industry with new, inspirational cotton fabrications, provide technical services, and collaborate with industry partners.

**Product Development and Implementation (PDI):** The textile research division within Cotton Incorporated that consists of Fiber Processing, Product Development, Textile Chemistry Research, Technical Services and Implementation, and Product Integrity.

**Product Development Laboratory (PDL):** This laboratory houses knitting and Computer Aided Design and Manufacturing equipment for producing fabric samples.

**Product Integrity (PI):** The department within PDI that is responsible for gathering information on standards and regulations that may threaten cotton’s market share, as a liaison with other divisions on matters related to sustainability and acts as the Chemical Hygiene Officer to ensure a safe working environment for the researchers.

**Research and Technical Center:** Cotton Incorporated’s research center is located in Cary, NC. For the activities covered in the Research and Development Committee, annual funding for operating the research center is allocated to include expenses for machinery, chemicals, contract labor, and materials.

**Technical Services and Implementation (TSI):** The department within PDI that is responsible for assisting global mill partners with the implementation of new technologies and maintaining quality production of those technologies, provide technical services, and support the marketing efforts of those technologies.

**Textile Chemistry Research (TCR):** Textile Chemistry Research is comprised of a team of researchers who investigate methods of cotton wet-processing improvement, sustainable wet-processing techniques, and who evaluate new dyes, chemicals, and application methods to enhance the performance and reduce the environmental footprint of cotton.

**Supply Chain and/or Suppliers:** For each technology marketed by Cotton Incorporated, part of the marketing strategy often involves identifying and working with manufacturers in the supply chain who can market and provide products to interested retailers, brands, or other companies. Cotton Incorporated works with and through established industry manufacturers to further the Company’s marketing ability and reach.
Global Supply Chain Marketing Committee

Global Supply Chain Marketing

**Cotton Council International (CCI)** – CCI is responsible for the international promotion of U.S. cotton primarily, but not exclusively, through the COTTON USA Mark program. The majority of CCI’s promotion funds are from the USDA’s Market Access Program, which is administered by the Foreign Agricultural Service. Cotton Incorporated is the largest private contributor to CCI, and these private funds are leveraged an estimated two to four times the amount of government funds. Cotton Incorporated staff work closely with CCI to ensure that the funded programs are complementary to the international activities. In many cases, CCI’s programs are part of a joint effort with Cotton Incorporated staff.

**Cotton Incorporated Sponsored Events** – Cotton Incorporated is often the host or primary sponsor of industry trade events.

**FABRICAST™ Collection** – The FABRICAST™ collection is a collection of knit and woven fabrics used to provide the industry with direction and inspiration for product development.

**Global Supply Chain** – This refers to the network of companies and organizations involved with the manufacturing, sourcing, development, and retailing of textile products and related products such as chemicals and equipment.

**ISP Workshops** – These technical education workshops are funded under the Importer Support Program.

**Suppliers** – For each technology marketed by Cotton Incorporated, part of the marketing strategy often involves identifying and working with manufacturers in the supply chain who can market and provide products to interested retailers, brands, or other companies. Cotton Incorporated works with and through established industry manufacturers to further the company’s marketing ability and reach.

**Tradeshows** – This term refers to industry events that often involve formal conference programs as well as exhibit and booth space. Examples of some of the more prominent tradeshows include Outdoor Retailer, Shanghai Intertextile, and Premiere Vision.

Consumer Marketing Committee

**Advertising, Corporate Communications, Brand Partnerships, and Corporate Strategy & Insights**

**Chinese Consumer Survey** – The Chinese Consumer Survey is an ongoing consumer survey in China that has been conducted quarterly since the third quarter of 2009 and is conducted jointly with Cotton Council International (CCI). Each year, the survey interviews 4,000 Chinese consumers between the ages of 15-54 who are primary shoppers for clothing in over 20 provinces and over 40 cities through random doorstep, face-to-face interviews. Results from the survey are representative of the urban Chinese clothing shopping population. The data are used both internally and externally for publications, presentations, and for strategic direction.

**Chinese Retail Audit** – The Chinese Retail Audit is an in-store retail audit of key retailers in Shanghai and Xi’an, China, that began in 2010 in Shanghai and is currently conducted each spring. In 2017, data were collected on nearly 30,000 apparel and home textile products from key brand specialty, hypermarket, and department stores as well as key specialty stores on Tmall (Tmall was added in 2016). Results from this audit are used to better understand the types of garments available at key retailers in China, pricing, performance offerings, and cotton’s presence in the market.

**Click Through Rate (CTR)** – CTR is a way of measuring the success of an online advertising campaign for a particular Website. The click through rate of an advertisement is defined as the number of clicks on an ad divided by the number of times the ad is shown (impressions), expressed as a percentage. For example, if a banner ad is delivered 100 times (100 impressions) and receives one click, then the click through rate for the advertisement would be 1%.
Executive Cotton Update – The Executive Cotton Update is focused on the U.S. economy and is designed as a tool to inform clients about how changes in the U.S. economy might affect the cotton supply chain. Retail sales, clothing store inventories, consumer confidence and spending, and U.S. import data are among the many statistics that are followed in this report.

Lifestyle Monitor™ Survey – The Cotton Incorporated Lifestyle Monitor™ survey is an ongoing consumer survey that has tracked consumers’ product and fiber preferences and shopping habits since 1994. Recent surveys allow for the inclusion of additional questions to analyze specific product-related questions or timely issues such as the economy or holiday spending plans. The data are used both internally and externally for publications, presentations, and for strategic direction.

Monthly Economic Letter – Cotton Incorporated’s Monthly Economic Letter is a regular publication that is released following USDA updates to their supply and demand estimates. This publication is designed to inform participants in the cotton supply chain about developments in the cotton market in order to help them make better and more profitable decisions.

Retail Monitor™ Survey – The Cotton Incorporated Retail Monitor™ survey is a quarterly retail audit of apparel products at 25 major U.S. retailers, in store, and online. The data are used both internally and externally for publications, presentations, and for strategic direction.

Supply Chain Insights – Supply Chain Insights is a publication focused on topics of current interest throughout the cotton supply chain, from fiber production to trade, sourcing and manufacturing, to retail and the consumer. This print publication has also been adapted to include digital video formats as a novel way to engage online audiences.