Sustainable Cotton Project





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Cleaner Cotton™ Executive Summary

Cleaner Cotton™

Cleaner Cotton™ is grown in California by farmers enrolled in the Sustainable Cotton Project (SCP), and is among the best quality cotton in the world. SCP growers farm Pima and Acala cottons, which are long and extra long staple fibers. respectively. Pima is best suited for 40's singles varn counts and finer, and Acala for 40's singles and courser. The majority of all the cotton acres grown in California are the Pima variety, accounting for close to 75% of the fiber grown. Cleaner Cotton™ supports local economies and family farmers while providing economically sustainable farm models and high quality, long staple fiber for all types of products.

Sustainable Cotton Project

The Sustainable Cotton Project's Cleaner Cotton™ program is a farmer-to-farmer information-sharing program, which has been active in California's Central Valley since 1996. Cleaner Cotton™ is a proven program that enables conventional farmers to adopt environmentally preferable, biologically-based IPM (Integrated Pest Management) farming techniques. Cleaner Cotton™ eliminates the use of the 11 most toxic chemicals used on cotton in California. Compared to other farmers in their region, Cleaner Cotton™ farmers have sprayed 50% to 73% less of the most toxic insecticides and miticides used on cotton.

Availability

Annually, SCP farmers produce about one million pounds of Cleaner Cotton TM .

Currently, Cleaner Cotton™ is spun at Hill Spinning in North Carolina, and can be supplied in 6's to 30's singles yarn counts. Parkdale Mills (also of North Carolina) can spin 40's singles Cleaner Cotton™ if a 40,000 pound minimum order is met.

This year in 2017, approximately 1.6 million pounds of Cleaner Cotton™ Pima fiber are available for product development. Fiber can also be shipped globally to your existing supply chain partners.

Grown and Sewn in the USA

Connect Cleaner Cotton™ spinners to your U.S. weavers to bring the fiber into your company's existing supply chain for a "Grown and Sewn" in the USA marketing angle. This increases awareness and concern about local jobs and fosters a stable domestic economy.

In the region where SCP works near Fresno, CA, unemployment averages 9.6% in Firebaugh, 14.8% in Dos Palos, and 18.6% in Mendota compared to the state rate of 5.4% (US Census Bureau, 2016). In this area, approximately 27% of residents live in poverty (compared with 15.3% across the state) and agriculture provides the main source of work. Your use of Cleaner Cotton™ builds awareness about rural California and domestic cotton production, and helps support jobs and the local economy.

"Cleaner Cotton™
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"The major cotton producing countries are the United States, China, India, Pakistan, Uzbekistan, Brazil, Australia, Egypt, Argentina, Turkey, and Greece Sustainable Cotton Project sustainablecotton.org

All About the Cotton Plant

The cotton plant belongs to the genus Gossypium of the family Malvaceae (Mallow). It is generally a shrubby plant having broad, three-lobed leaves and seeds in capsules, or bolls. Each seed is surrounded with white or cream colored fiber, which is easily spun.

Cotton is tropical in origin but is most successfully cultivated in temperate climates with well-distributed rainfall. However, all western U.S. cotton and as much as one-third of Southern cotton is grown under irrigation. In the United States, nearly all commercial production comes from varieties of upland cotton (G. hirsutum), but some quantities of Acala and Pima cultivars are grown in the Western USA.

Cotton is grown between 37 degrees North (Ukraine) and 30 degrees South (Australia) in warm, frost free, sunny climates. Cotton requires a lot of sunshine with temperatures between 60 to 95 degrees Fahrenheit. The major cotton producing countries are the United States, China, India, Pakistan, Uzbekistan, Brazil, Australia, Egypt, Argentina, Turkey, and Greece.

Cotton plants start from seeds. The seeds germinate in 5 to 10 days. Cotton has a tap root system and its roots go deep into the soil in search of nutrients.



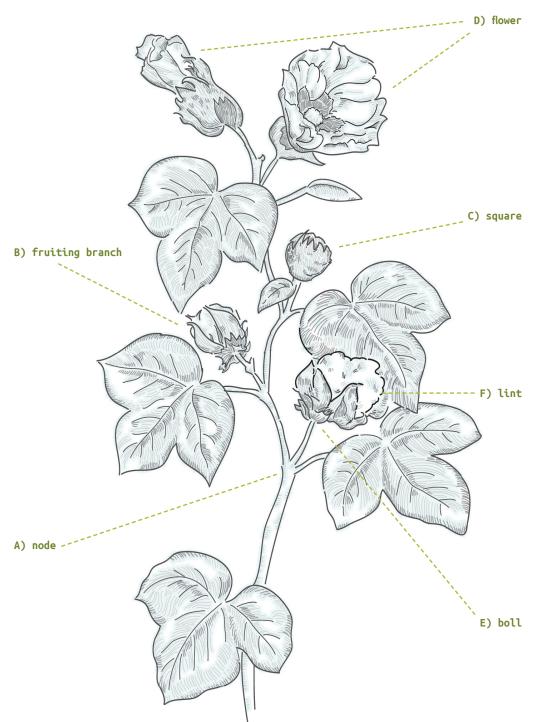
Cotton anatomy

Stem & branches

As a cotton plant begins to grow, it develops a series of **nodes** (A) up the main stem. Beginning with the fifth or sixth node, the plant begins to form **fruiting branches** (B), which bear the cotton fruit. Typically, cotton plants will continue to add nodes and fruiting branches for a total of 16 to 22 nodes, with 12 to 16 fruiting branches.

Roots

Cotton's **tap roots** (not shown) can grow as deep as 10 inches in the first 3 weeks after planting. Roots can grow up to 2 inches per day during the early stages of growth, making them twice as long as the plant height. When plants begin to set bolls, root growth slows abruptly.



Squares, Bolls and Fruits (Reproductive stage)

The flower bud that first appears on the plant when reproductive growth begins is called a **square** (C). Squares grow for about three weeks before a **flower** (D) appears. Cream or yellow flowers open during early morning hours. The flower petals turn pink on the second day and later dry up and drop off and then form a **boll** (E). The cotton plant is constantly adding squares to the plant and then aborting squares or young bolls to balance out the demand of the growing boll load.

Cotton fiber, or **lint** (F), comes from inside the boll. The crop is harvested once the bolls open up and dry out, revealing the lint inside.

Note: this diagram shows only part of a cotton plant at multiple stages in its life cycle at once.

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California Cotton

History and the Basics

California cotton is grown primarily in the San Joaquin Valley. At the industry's height in the 1950s and 1960s, growers cultivated more than 1 million acres annually, producing a crop worth more than \$1 billion a year to the California agriculture economy. Over the years, cotton acreage has been replaced by tree crops, vines, alfalfa, and silage crops (such as corn). In 2015, cotton's economic value fell to \$281 million with only 162,000 acres grown. The low economic return on cotton combined with the relatively expensive cost of water during drought conditions has steadily eroded cotton acreage in California as farmers utilize water on more valuable crops. In 2015, acres of cotton planted were the lowest they've been since the 1920s. An estimated 564,000 acres of cropland in the state have been idled as a result of several years of drought, triggering an estimated \$1.84 billion of direct agricultural losses, plus the loss of about 10,000 direct seasonal jobs.

The shrinking acreage of cotton over the years has in turn impacted the state's cotton gin industry, which peaked in 1963 with 299 active operations. Today, there are less than 25 active gins statewide. Despite the decline, the remaining gins have increased capabilities and efficiencies to continue serving the needs of growers.

Globally, San Joaquin Valley cotton is among the highest quality in the world, characterized by its extralong, strong fiber. The region is renowned for two high-end varieties: San Joaquin Valley Acala (SJV) and American Pima.

"Globally, San Joaquin Valley cotton is among the highest quality in the world, characterized by its extra-long, strong fiber."



A special type of upland cotton, which is the most commonly produced variety in the United States. Grown only in the Central Valley, SJV Acala commands a premium price because it is higher quality and is used in products such as fine knits, bath towels and dress shirts.

American Pima

The Cadillac of cotton in the USA.

American Pima rivals the fine
Egyptian cotton used in the highest
quality knit and woven apparel
as well as bed linens. California
produces approximately 90% of the
nation's Pima cotton.

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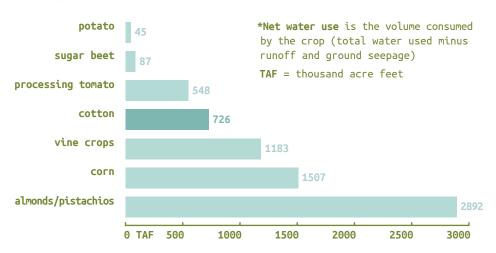
Cotton yields: California vs. USA (lbs/acre)

Sources: Sustainable Cotton Project, California Cotton Ginners and Growers Associations, USDA National Agricultural Statistics Service, National Cotton Council, California Department of Food and Agriculture, California Farm Bureau Federation and Calcot Ltd.



Net water use in California: selected crops (TAF)*

Source: California Agricultural Production and Irrigated Water Use (Congressional Research Service, 2015) using data from J. Medellín-Azuara, J. Lund, and R. Howitt, UC Davis, "Jobs per Drop Irrigating California Crops," 2015.



California Cotton (continued)

A Unique Crop-Food and Fiber

- » Sixty percent of a cotton crop by weight is seed. More than 95% of cottonseed is fed to dairy cattle as a protein supplement. The rest is processed into oil used for cooking, salad dressings, cosmetics, soaps, chocolate, processed foods, etc.
- » California cotton fiber is versatile and can be used in a variety of knitted and woven products from fine t-shirt weights to high quality woven fabrics. It's seen at its best when made into combed and ring spun yarns.

Growing Season

- » Planted in April, the cotton plant takes about 180 to 200 days to reach full maturity for harvest.
- » Irrigation ends in August to allow plants to dry out.
- » The crop is harvested in October.
- » Cotton is harvested mechanically in California and the USA.

Did you know?

- » A full-sized cotton bale weighs about 500 pounds and stands 4½ feet high.
- » A typical bale produces 3,400 pairs of socks, 750 shirts or 325 pairs of jeans.
- » Linters, the fuzz left on the seed after ginning, are used to make a variety of products including dynamite, gunpowder filler, mops, rayon, cotton balls, and currency.
- » Cellulose the main component of the cotton fiber — is extracted from the linters to make products such as paint, toothpaste, and tool handles.
- » More than 90% of California cotton is exported.

Cotton Comparisons

Organic Cotton

Organic cotton is grown according to the USDA's National Organic Standard. A USDA-accredited certifier verifies that farmers and handlers meet the standards set by the USDA National Organic Program. Organic cotton uses nongenetically modified seed.

The cost to grow organic cotton in California is higher than brands are willing to pay. In organic trials that SCP farmers have run, organic cotton fields yielded as much as 30% less fiber than conventional fields with average yields of 485 pounds of cotton per acre (USDA National Ag statistics). Cleaner Cotton™, on average, can yield more than 1,500 pounds of cotton per acre. Lacking a secure market, many farmers are unwilling to risk the lower production volumes and corresponding decrease in financial return with organic cotton.

Because Cleaner Cotton™ maintains yields, it represents less economic risk to the grower and is therefore more effective than organic cotton at converting farmers and

acres to biological practices. Overall, this scalability can achieve greater chemical reductions than the small organic cotton niche. In California, no organic cotton has been grown for the last several years, while Cleaner Cotton™ represents more than 1,000 acres. The higher fiber yield per acre achieved by Cleaner Cotton™ has an additional bonus besides economic viability; it also means less water is required per harvested pound of Cleaner Cotton™ vs. organic cotton.

"Organic cotton fields yielded as much as 30% less fiber than conventional fields with average yields of 485 pounds of cotton per acre. Cleaner Cotton™, on average, can yield more than 1,500 pounds of cotton per acre."

BCI Cotton

The Better Cotton Initiative is a global effort to improve the social, economic, and environmental sustainability of cotton production throughout the supply chain. Cotton accredited by the Better Cotton Standard System uses less water, fewer pesticides, and is grown using ethical labor practices. All farmers enrolled in BCI must complete extensive paperwork reporting on the practices and conditions of their farm.

BCI cotton is now grown in California, and a number of our SCP cotton growers enroll their farm in BCI to increase their market share. All BCI certified cotton becomes part of a global pool that can be sold worldwide to buyers concerned about sustainable and ethical growing practices for their products.

Cleaner Cotton™

Cleaner Cotton™ is the registered trademark for cotton fiber grown in SCP's program. Similar to BCI cotton, Cleaner Cotton™ is grown according to a set of guidelines provided by SCP regarding sustainable growing practices.

Cleaner Cotton™ disallows the most toxic chemicals used in California cotton production. These chemicals are selected based on toxicity, volume of use, and available alternatives. Cleaner Cotton™ also utilizes biological farming methods as a basis for growing cotton more sustainably. Unlike BCI cotton, each bale of Cleaner Cotton™ is traceable back to the exact field it was grown in.

California is the only state that requires documentation of chemical use by all farmers in each county. This information is available to the public through the California Department of Pesticide Regulation at www.cdpr.ca.gov. Cleaner CottonTM toxicity reductions are measured against this data.



City of Firebaugh

History

Incorporated in 1914, Firebaugh has grown from a "sheep shearing station and ferry crossing" to a small agriculture-based city with more than 8,000 residents. Before railroads, the San Joaquin River was the major thoroughfare to upstream communities. The ferry was the major crossing for prospectors heading for gold country. Ferries were the only way to cross the river until the late 1800s when the first bridges were built. The San Joaquin River played a major role in settling the valley. Firebaugh is one of the oldest historical towns on the valley's west side.

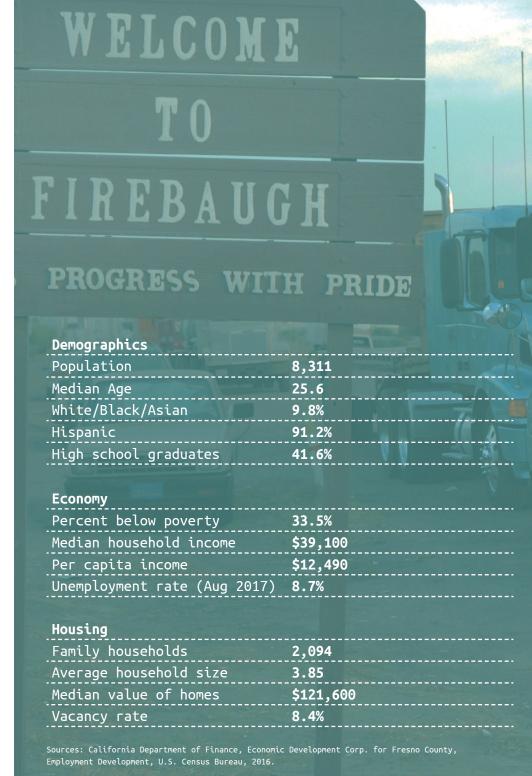
Regional Facts

Firebaugh is located in Fresno
County, which ranks as one of the
largest and fastest growing and
most diverse counties in the state.
With agricultural production of \$6.2
billion in 2016, the county ranks as
the state's No. 1 agricultural county.
Underlying the agricultural prosperity,
though, is the economic struggles of
Firebaugh and the rest of the region.

Fresno County's poverty rate ranks as one of the highest among the country's 100 largest metropolitan areas, according to 2016 U.S. Census data. Roughly 25.2 percent of the county residents lived in poverty (33.5 percent in Firebaugh) compared to 15.3 percent statewide.

Regional Agriculture

Farmland totals 1.88 million acres with agricultural operations covering nearly half of the county's 3.84 million acres of land. Farmers grow nearly 400 different crops and support almost 1 out of every 5 jobs in the region. Every \$1 generated on the farm produces another \$3.50 in the local and regional economy. The top five commodities in 2016: Almonds, \$1.2 billion; grapes, \$715 million; poultry, \$495 million; cattle, \$424 million; and tomatoes, \$409 million. Cotton's value was \$103.2 million, up from \$87.8 million in 2015.



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an open cotton boll



3. machine harvesting a cotton field



5. pressing a module



7. plastic-wrapped bales



2. defoliated cotton in the field



4. emptying the boll buggy



6. covering the module with tarp



8. cotton ready for the gin

How cotton is harvested

Cotton is ready for picking after the bolls burst open in October.

Growers apply a harvest aid, or defoliant, to help the bolls open fully and make the leaves fall off the plant. By defoliating the cotton, the fiber can be harvested cleanly without leaves and other plant debris contaminating the lint.

Harvesting is accomplished by machines in the United States. The machines can pick four or more rows of cotton at a time, depending on the size of the harvester. Approximately 30% of global cotton production is machine-harvested. In India, much of the cotton crop is harvested by hand. While hand picking is a slow, this process better preserves the fiber characteristics.

Harvesting machines use rotating barb spindles to pluck the cotton from the plant and suck the fiber into a basket known as a boll buggy. Once the basket is full, it is emptied into a mechanical module builder. which hydraulically presses the fiber into a module. Workers then cover

the modules with tarps to protect the fiber. The modules remain in the field until a specially designed truck transports them to a gin for processing.

New cotton pickers have changed this process, eliminated the need for a module maker and reduced the number of workers needed to pick cotton. The new picker makes a round bale that is wrapped on-thego with a plastic film. These bales have a maximum diameter of 7 feet. 6 inches. Its seed cotton weight can be up to 5,000 pounds and can hold 3.8 bales of cotton lint.

The picker is fitted with a rear round bale carrier much like the big bale square hay balers. This allows the operator to carry completely round cotton bales to the end of the field while making another round bale as he continues picking. The carrier deposits the round bales in the turn row where a tractor can pick them up and deposit them atop a flatbed trailer.

How cotton is ginned

Cotton fibers are produced in the seed pods (bolls) of the cotton plant. The fibers (lint) in the bolls are interspersed with the seeds. The seeds must be removed from the lint to make the fibers usable. Historically, this task was performed by hand — production of cotton required hundreds of man-hours to separate the seeds from a usable amount of lint. Many simple seed-removing devices have been invented over the years, but until the invention of the cotton gin, most required significant operator attention and worked on a small scale.

In modern cotton production, cotton arrives at cotton gins in compressed modules or bales. These are broken apart and the fiber enters a dryer, which removes excess moisture. The cotton then passes through six or seven rotating spiked cylinder cleaners. These cylinders break up large clumps of cotton and remove finer foreign material, such as soil and leaves. Larger foreign matter is removed using centrifugal force. Teeth of rotating saws pull the cotton through a series of ginning ribs, which separate the fibers

from the seeds. Long fiber Pima cottons must be ginned in a roller gin because saw gins can damage the delicate fibers. A roller gin uses a rough roller to grab the fiber and pull it under a rotating bar with gaps too small for the seed to pass.

Cotton seed is used as cattle feed or is sent to an oil mill to be processed into cottonseed oil and cottonseed meal, with some seed retained for the next crop. Finally, lint cleaners use saws and grid bars to separate immature seeds and any remaining foreign matter from the fibers. The cotton then enters into a press where it is formed into bales of approximately 500 pounds for storage and shipping. Modern gins can process up to 15 tons (33,000 pounds) of cotton per hour.

All US cotton bales are identified with the USDA Permanent Bale Identification (PBI) bar code to monitor quality, and can be traced back to the farmer and the field where the fiber was grown. Cleaner Cotton™ bales are also identified with the Cleaner Cotton™ Bale Tags.



1. raw cotton lint full of seeds



3. gin processing cotton lint



5. piles of seeds separated from lint



7. Permanent Bale Identification tag



2. modules entering gin



4. packing ginned lint for shipping



6. seed for further processing



8. tagged bales ready for shipping

Grower profile: Dan McCurdy

Cotton is a common thread in Dan McCurdy's family.

His father worked with cotton for more than six decades. McCurdy has cultivated high-quality American Pima cotton for nearly 25 years Together, they experienced cotton's heyday of the 1950s and '60s - a time when the fiber ruled California agriculture, covering more than 1 million acres of prime farmland every year and generating over \$1 billion in annual revenue. And they witnessed its steady decline as other farmers abandoned cotton for higher value crops such as almonds and wine grapes. By 2015, total acreage for American Pima and Acala varieties had tumbled to 162,000 acres, the lowest in a century.

"I've seen some growers come and go," says McCurdy, who operates D&V McCurdy Farms in Firebaugh. "Cotton has been pretty consistent for me."

To McCurdy, cotton is part of the fabric of his life. That's why he's continued planting cotton – even when global prices slid; even when drought tightened water supplies,



and even when land rents and other costs climbed. Farmers like McCurdy are turning to advances in technology to stay competitive in today's challenging economic climate.

"The costs are going up, but the price you receive for your crops is the same. You need more mechanization to keep your costs down. You need to be more efficient with your work," McCurdy says.

This season, for example, McCurdy acquired a new John Deere all-inone cotton harvester – a big green and yellow machine that picks and collects the fiber and then builds a round module ready for transport to the gin. "The picker will pick a lot faster," he says. "It's a lot more efficient."

Environmentally-friendly, low- impact cotton is another key to sustaining the crop in California. "Everyone wants to be more sustainable," says McCurdy, who has grown trademarked Cleaner Cotton™ as a member of the Sustainable Cotton Project for the past eight years.

"We're not going to spray unless we have to."

Growers like McCurdy are demonstrating to fellow farmers how Integrated Pest Management and reduced chemical use can work effectively in cotton and other crops. With more education, McCurdy says, consumers will agree to pay a little more for products made with Cleaner CottonTM – just as they do for fruits and vegetables grown sustainably.

"It's a good concept," McCurdy says. "We're not going to spray unless we have to."

Born in Dos Palos, McCurdy spent his lifetime in the heart of one of the world's richest agricultural regions. During his school years, McCurdy spent summers working on his dad's ranch as well as his uncle's farm. In 1974, McCurdy and his wife, Vickie, finally earned enough to start their own business, launching D&V McCurdy Farms and planting 640 acres of cotton, grains and tomatoes. Over the years, he has grown rice, sugar beets, cantaloupes, processing tomatoes, honey dew melons, alfalfa, pistachios and cucumbers. Today, he farms 2,800 acres, more than 1,200 of which are cotton.

"I always wanted to farm on my own," McCurdy says. "You're always outdoors – not living in a city or a town."

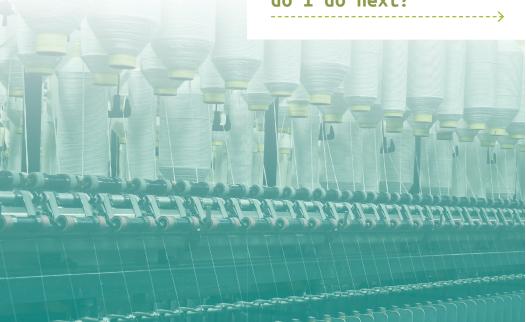


9 Reasons To Implement a Cleaner Cotton™ Program

- 1. It supports the family farmers and rural economies of California.
- It documents the conversion from chemical-intensive farming to biological systems to control pests.
- It documents the amount of chemicals reduced.
- **4.** It eliminates the use of the most toxic chemicals used on cotton.
- It provides a scalable approach to cleaning up cotton in California.

- **6.** It augments the environmental goals of any existing organic cotton program.
- 7. It grows a consistent number of acres each season. And with orders from brands and global markets, farmers will plant more and acreage will increase.
- **8.** It offers the option for non-GM seed, which maintains the supply of this seed for the future.
- It is a moderate water user in California.

I'm convinced, what do I do next?



Plan

Contact SCP's Lynda Grose to discuss your fiber needs at: *lyndagrose@gmail.com* or 415.309.8210. You will need to:

- » Know what volume of Cleaner Cotton™ products you need
- » Know the date you need finished goods for retail or wholesale
- » Know the yarn count used in the fabric you intend to convert to Cleaner Cotton™

If you need large quantities of Cleaner Cotton™ goods, secure your fiber supply through a commitment at time of planting (April).

Decide supply chain partners

- » Speak with your existing suppliers and ask them to specify Cleaner Cotton™ fiber for your fabrics and products
- » Direct your spinner to order fiber from the brokers handling Cleaner Cotton™
- » Tap into SCP's supply chain for your Cleaner Cotton™ fiber, yarn fabric and product orders (pg 26)

Cleaner Cotton™ is available as:

- » bales of fiber
- » roving (carded, ready for spinning)
- » sliver (combed, ready for spinning)
- » yarns ranging from 3's singles to 30's singles and several 2 and 3 plied options
- » jersey knit fabric
- » French knit terry fabric
- » finished garments
- » towels

See page 26 for Cleaner Cotton™ suppliers.

Spread the word

Contact SCP for promotional materials, presentations, label artwork and high-resolution photos to help market your Cleaner Cotton™ products. SCP staff and farmers are available upon request for press interviews, store and trade show appearances, and company presentations.

Cleaner Cotton™ Development Contacts

Cleaner Cotton™ Development strategy/marketing

» Sustainable Cotton Project – Lynda Grose lyndagrose@gmail.com

Fiber

- » Jess Smith and Sons Ernie Schroeder ernie@jesssmith.com
- » Calcot Claud Acker cacker@calcot.com

Spinning

» Hill Spinning – Mark Leonard leonja3@aol.com

Finished yarns

- » Quince and Co. Ryan Fitzgerald ryan@quinceandco.com
- » Lunatic Fringe Michele Belson michele@lunaticfringeyarns.com

Fabric Development/conversion

- » California Cloth Foundry Lydia Wendt lydiawendt@gmail.com
- » Spiritex Daniel Sanders sales@spiritex.net

Sustainable Cotton Project Resources

Find us online

For information, news, events, videos and links to educational materials, visit the SCP website: sustainablecotton.org

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Twitter

@SustainCotton twitter.com/sustaincotton

Youtube

Sustainable Cotton Project youtube.com/user/SustainableCottonPjt

Our sustainable ag blog

A View From the Field centralvalleyfarmscout.blogspot.com

Get in touch

530,370,5325

SCP Director Marcia Gibbs for information about the program: marcia@sustainablecotton.org

For Cleaner Cotton™ development, contact Lynda Grose:

lyndagrose@gmail.com 415.309.8210



