

KENTUCKY CLOTH



*Hemp in the research plot at St. Catharine College
(photo by Donnie Hedden, courtesy of Patagonia), sheep
at Final Frontier Farm (by Meg Wilson Photography)*



FIBERSHED

Local Fiber, Local Dye, Local Labor

THIS KENTUCKY CLOTH was grown in the fields of the Berry Farming Program and the pastures of Paris (*Kentucky*). The cloth is an expression of a land base that was once our nation's leading producer of hemp—a crop that functioned as the mainstay until tobacco became prominent after the Civil War. Hemp grows well on these bucolic and summer rain-fed fields. Historic figures show that between 5 and 12 tons of dried stalk could be harvested per acre, depending on conditions and soil types.

The KENTUCKY CLOTH PROJECT emerges at a time when over 70% of the world's fiber dependency is based upon the consumption of plastic, otherwise known as polyester. As humans divest from fossil carbon in this era of *'keep it in the ground'* and there's an outright necessity of bringing climate consciousness into our material culture, the very nature of our second skin must change. Poised to reinvigorate our relationship with homegrown and compostable natural fibers, a cadre of farmers, designers and community organizers are preparing for the wearers to recognize that our clothes are grown, and the soil is the birthplace of all that nourishes and protects us.

The cloth sample included in this first edition document is a testament to an iterative engineering process that has been years in the making. There are many fiber blend permutations yet to come—this is just the beginning of the creative process. We look forward to seeing where this project goes next with an infusion of interest from designers and textile businesses that we invite wholeheartedly to use this document as a foundation for developing their own 'soil-to-soil' textiles in collaboration with the farms listed here (as well as other growers with whom they seek to build relationships).



*Historic photo (above) courtesy of The Kentucky Hemp Museum;
Kentucky sheep farm (right) courtesy of Sara Dunham, Equinox Farm*



*“The soil is the great connector of lives,
the source and destination of all...
Without proper care for it we can have no community,
because without proper care for it we can have no life.”*

— WENDELL BERRY

THE PROCESS: FROM SOIL TO CLOTH



Row 1: Berry Farming Program at St. Catharine College – Planting day (courtesy of St. Catharine College); Harvest day – Dr. Shawn Lucas, Mike Lewis, harvested hemp stalks (three photos by Donnie Hedden, courtesy of Patagonia); students stacking the harvested hemp in stooks (courtesy of St. Catharine College); John Lupien of BastCore with hemp decortication equipment (courtesy of BastCore). **Row 2:** Decorticated hemp, softened hemp; Final Frontier Farm – Kathy Meyer and her sheep (two photos by Meg Wilson Photography), shearing (courtesy of kentucky.com), skirted wool (courtesy of Sara Dunham, Equinox Farm). **Row 3:** Fiber preparation at Waite Hill Fabrics includes blending, carding and spinning (three photos courtesy of Waite Hill Fabrics); Finished cones of yarn arrive at the weaving studio, preparing the loom, test weaving in progress (three photos courtesy of TangleBlue, San Francisco).



30 end / 20 epi

36 epi / 18 ppi

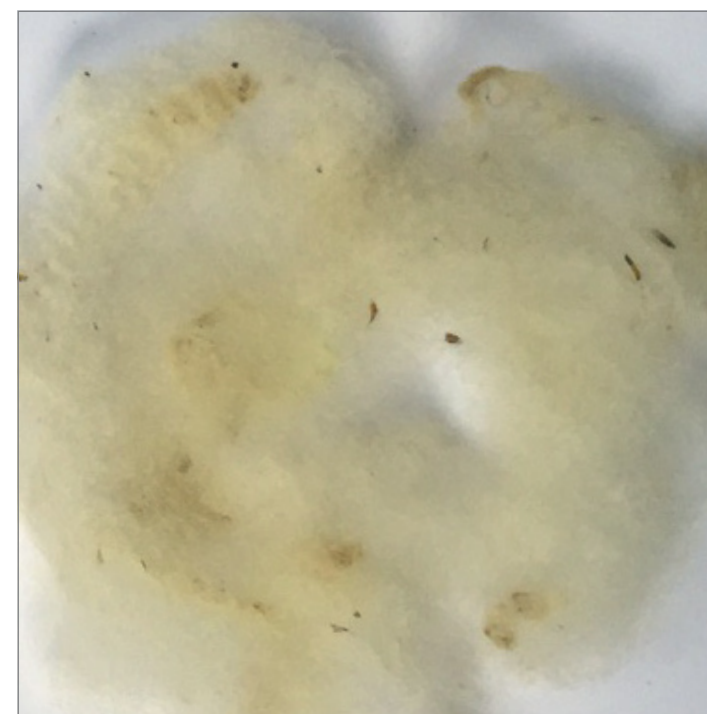
36 e / 24 ppi



Pure decorticated hemp



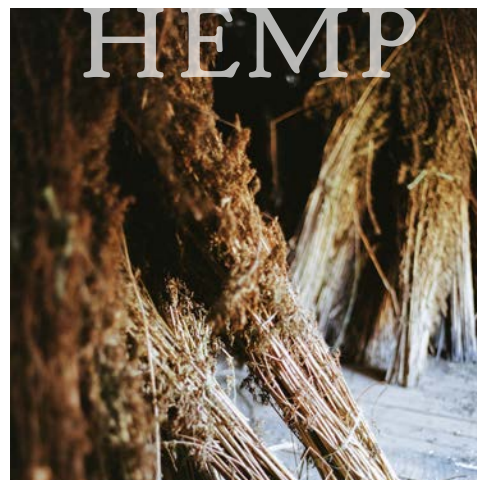
Degummed hemp



Raw washed wool



Finished yarn



FARMING

“It’s no secret that America needs more farmers, but we need the tools to be successful. Industrial hemp is a community-building industry, and a cornerstone for financial and resource stability on the family farm.”

– MIKE LEWIS

BERRY FARMING PROGRAM at St. Catharine College grew the hemp for this cloth sample, consisting of 40% of the weight of the fabric. The stalks were grown on a one-acre research plot that was created to determine the relationship between post-harvest field treatments and soil health. Soil carbon metrics were taken in addition to other soil health indicators. Preliminary results from this research will be available by the summer of 2016. Brands and design houses seeking to understand the regenerative capacity of hemp farming might be interested in incorporating the results of this research into their public facing narrative, as a means to connect the story of soil with the garments we wear.



*Photos (clockwise from far left):
Hemp stalks (Meg Wilson Photography);
Mike Lewis harvesting hemp, Dr. Shawn Lucas and students, hemp at St. Catharine College research plot, Mike planting hemp seeds with one of his children (four photos by Donnie Hedden, courtesy of Patagonia)*

Farms Growing Hemp & Ready For Engagement

*All permitted by the Kentucky
Department of Agriculture*

Mike Lewis

Healing Grounds Farm
Livingston, KY
cridgefarm@gmail.com
606-392-3312

4 acres (home region) and 6 acres
in collaboration with the National
Black Farmer’s Association (in 2016)

HF Farms, LLC

Former mountain top removal sites
Hippo, KY 41653
606-358-2995
15 acres (in 2016)

Lora Smith

Big Switch Farm
Egypt, KY
kentuckyfolklora@gmail.com
606-524-4074

2 acres on her home farm/works with
farmers who represent 50 acres (in 2016)



PROCESSING



Decortication

THE MECHANICAL DECORTICATION of the hemp stalks was done by BastCore, a new engineering and processing company located in Omaha Nebraska. The machine they have developed separates the hemp stalks into bast fiber and core wood. The mechanical action of their hemp ‘gin’ allows for the processing of dried or dew retted hemp stalks and minimizes fiber damage. This minimization of fiber damage is a key feature in preparing material for the next stage of the value-chain, which is degumming. BastCore is currently prepared to work directly with farmers to process their stalks (or with brands and design houses that are purchasing their stalk directly from farmers), and can implement subsequent degumming work, as well as fiber testing for customers.



Contact:

John Lupien
BastCore LLC
Omaha, NE
402-880-2087

Metrics from Field to Cloth

Whole hemp stalks in their dry weight = 75 pounds
Decorticated fiber weight = 45 pounds
Degummed fiber weight = 10 pounds

The decorticated fiber contained more wood than it will in subsequent processes (as the decortication system is refined). The actual decorticated fiber weight was likely 19-23 lbs. You can expect 25-30% of the weight of the stalk to be returned as decorticated fiber. 50% of that decorticated fiber weight will be recovered in the degumming process.

“Bastcore purchases hemp stalks as our primary business. At this early stage of industry development we are excited to work directly with farmers or organizations providing decortication, fiber degumming, yarn production, and fabric development services. In the future, we foresee offering turn-key hemp processing systems for the production of fiber products through a licensing or partnership business structure.”

– JOHN LUPIEN

Degumming

THE FIRST DEGUMMING EXPERIMENTS were conducted by John Lupien of BastCore in a 20-gallon wool scouring tub, and the fiber was partially dried in a household dryer in mesh bags. The fiber was manually pulled apart into tufts and fed into a coarse spiked opener. Approximately 10 pounds of degummed fiber was recovered after opening, meaning the conversion rate was approximately 2:1.

These numbers will improve as greater efficiency is built into the decortication and degumming technologies.

The degumming process was designed to minimize environmental impact and reduce process costs. The process produces clean, soft hemp fiber in 30-45 minutes. The effluent is neutralized during the process and the pH is balanced. Because high pressure and high temperatures are not necessary, the technology can be scaled into a tunnel washing system, which will allow for the process water to be recycled.

BastCore is currently installing a new system for decortication and degumming that is scheduled to come online in the summer of 2016. The new degumming capacity is expected to yield between 100 to 150 pounds per day of textile grade fiber, which is close to 3,000 pounds per month.

*Photos (left to right):
Decorticated hemp, John
Lupien of BastCore with the
decortication equipment, hemp
in the four stages of processing
utilized in the Kentucky Cloth
Project: dew retted, decorticated,
softened, blended with wool
(photos courtesy of Rezolana
Institute, BastCore and Waite
Hill Fabrics)*



“My hope for the KY Cloth Project is it will be a sustainable marketing avenue that will highlight the dedication to the sheep and hemp industry by KY farmers.”

– KATHY MEYER

KATHY MEYER raised the wool that is 60% of this fiber blend. She can provide a minimum of 700 pounds of wool annually, which becomes available every March after the sheep are sheared. She also has access to sister flocks and at least 500 pounds of additional wool fiber. Kathy breeds a ewe flock with a Texel X Wool Breed (Cotswold, Wensleydale, Rambouillet). The wool breed ram is Border Leicester X CVM/Rambouillet. She takes great care in producing a high quality wool. The mill we worked with was very impressed and said it worked well on all the machines.

Contact:

Final Frontier Farm
Paris, Kentucky

Tony and Kathy Meyer, Shepherds
tonym243@bellsouth.net
or 859-749-7594

Price:

Wool is available
for \$2.75 per pound
in the grease.



Wool Washing Process

THE WOOL from Kathy Meyer’s farm was washed and partially picked by HeartFelt Fleece and Fiber. Pat Grenier and her family own and operate the facility—they process both wool and fine fiber—and their services include: skirting, washing, picking, carding and felting. The mill also functions as a fiber studio and they create many unique clothing items and felt pieces that are sold across the country.

Contact:

Pat Grenier
HeartFelt Fleece and Fiber
Cynthiana, KY 41031

heartfeltfleeceandfiber@gmail.com
www.heartfeltfleeceandfiber.com

“Although I am not originally from Kentucky, I have chosen to make this state my home. The hot summer days, cool nights, and dewy mornings provide the perfect environment for growing hemp and raising woolly sheep. I hope the Kentucky Cloth Project will provide an exciting and viable livelihood for the new generation of farmers and shepherds.”

– PAT GRENIER

Photos (left to right): Raw wool, Kathy with her sheep (two photos by Meg Wilson Photography); Final Frontier Farm (two photos courtesy of Sara Dunham, Equinox Farm)



WAITE HILL FABRICS, a mill currently operating out of upstate New York, conducted the carding, combing and spinning processes. Research mills across the United States had been engaged to conduct this blending and yarn making research, and after continued searches and experimentation, a technician who could ‘*crack open the problems and challenges*’ and administer solutions, was found.

The production quality of Bruce Bennett’s facility is focused on fine count worsted yarns. Bruce has pioneered wool and hemp blending processes as evidenced in the yarn and cloth sample within this document. He is currently working on other natural fiber blends that include hemp, wool, alpaca and organic cotton.



The current scale of production is set for prototyping, research and small unit runs. The mill can process raw fiber and is vertically integrated to include finished garment and ecological finishing of fabrics through a vertically integrated system. Bruce can also provide consulting services and technical support for those interested in producing hemp and hemp blended yarn.

“We will be able to soften the fabric as we get the degumming process refined. A blend of local wools and some other natural fibers could soften it also.”

– BRUCE BENNETT

Scaling Bruce Bennett’s operation is currently being evaluated to support considerably enhancing his ability to produce higher output at lower prices.

Contact:

Bruce Bennett
Waite Hill Fabrics
Taberg, NY
brucebennettwaite@gmail.com



Yarn in the cloth sample

The 12-count cotton in singles yields 10,000 yards per pound

The 2-ply yarn yields 5,000 yards per pound



Photos: Finished cones of yarn (far left), yarn being spun on the spinning frame (center), fiber preparation for spinning includes (above, top to bottom) the picker, blending, carding (courtesy of Waite Hill Fabrics)

“Our first cloth sample was intended for useful and durable goods. The rustic nature of hemp (as it stands with our current capability to soften it), creates a rough and lasting yarn, and thus has been woven into a cloth that will endure if used in the creation of luggage, shoes, American flags, and perhaps a good barn coat.”

– REBECCA BURGESS



LESLIE TERZIAN MARKOFF of TangleBlue in San Francisco, California, wove a series of tests using various fabric constructions to identify the specification for a woven prototype appropriate for manufacturing. Our first cloth samples are a result of her initial exploration. She is a professional weaver and has relationships with medium and large scale textile mills within the United States. Leslie designs woven fabrics for designers and brands. She is available for consulting and sample work, and able to advise designers how to scale production for larger runs with her milling partners.



Contact:

Leslie Terzian Markoff
TangleBlue
Shipyard at Hunters Point,
San Francisco, CA
leslie@tangleblue.com



Photos (clockwise from far left): Leslie at work in her studio (two photos by Paige Green Photography), cloth prototype in progress, preparing the loom, the yarn (three photos courtesy of Leslie Terzian Markoff).



Future weaving processes

THE WEAVING WAS INITIATED with just over four pounds of yarn. This quantity of yarn was determined by the weight of the research stalk harvest from the Berry Farming Program. The yarn could be mechanically woven in future, and has been deemed high enough quality to endure the tension of that process.

Yarn production for a mechanically woven cloth sample would have required much greater quantities of yarn than was available in this first round of research. With the expected harvest weights coming forth from the 2016 crops, enough fiber will be available to create plenty of yarn to support a mechanical weaving process this coming year. Future supply chains will be able to count on large scale weaving capabilities. Mechanical weaving processes would both enhance the speed of production and bring prices of finished yardage down considerably.

STRATEGIC PATH FORWARD



INVESTMENTS in both the degumming process as well as the carding, combing and spinning processes are necessary precursors to being able to bring hemp-blended yarns to scale. Once a perfected degumming and milling system has been operationalized in one location and the demand for bioregional cloth is established, the justification for decentralizing these systems will exist. Early stage designer and brand interest is essential. All of the aforementioned farmers, millers and engineers look forward to hearing from you. Together, we can make hemp and hemp blended textiles a reality from soil to skin.

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(photo by Donnie Hedden, courtesy of Patagonia); sheep
at Equinox Farm (photo courtesy of Sara Dunham)*

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