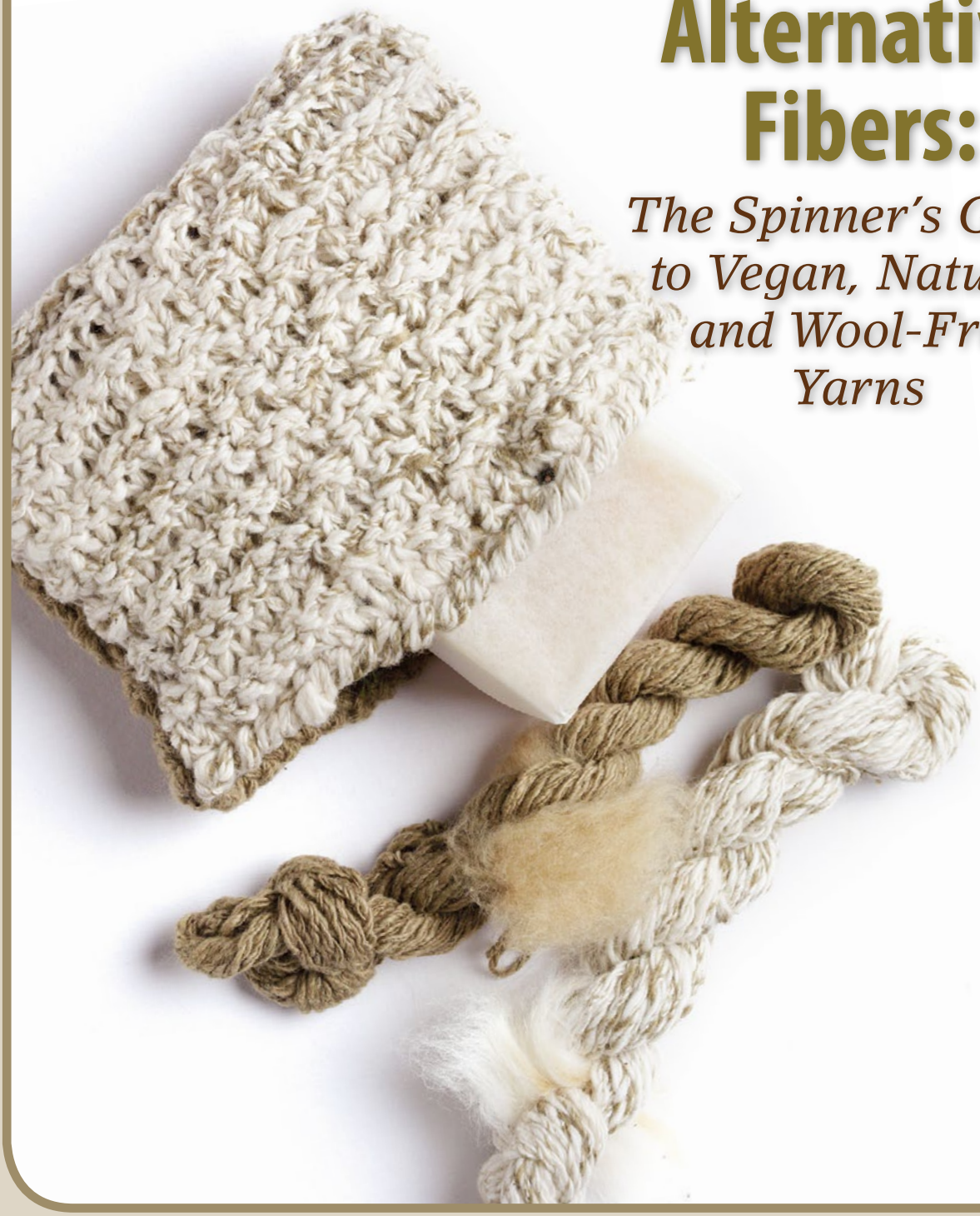
spinning daily presents

Alternative Fibers:

The Spinner's Guide to Vegan, Natural, and Wool-Free Yarns



Spinners have worked with wool for thousands of years, and with good reason: it dyes easily, wears well, and comes from cute sheep. But it's not the only option available nowadays. We can spin fiber produced from other animals, from plants, or from manufacturing processes. Bamboo, soy, and corn can all be made into yarn. So can wood pulp and seaweed: if you've never heard of Seacell, Modal, or Lyocell, read on.

Do all of these spinnable fibers qualify as natural? Are they vegan (i.e., animal-friendly) or at least animal-neutral? How sustainable are the different production methods? It depends on your personal definitions and choices. Some people might see rayon, extruded from wood pulp, as too far removed from Nature, while others might prefer rayon to water-intensive hemp retting.

You'll read about protein and cellulose fibers in the first article, then find others on plant-based fibers, either directly from the plant or processed in some way. If you want to spin something other than wool, you can find the perfect substitute here.

Happy spinning,

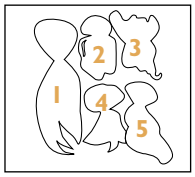
Anne Merrow
amerrow@interweave.com

What are natural fibers?

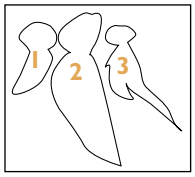
BY AMY CLARKE MOORE

Natural fibers occur naturally in nature, naturally. *(Sorry. Couldn't resist.)* It seems obvious, but it actually can be confusing. There are manufactured fibers that originate with or incorporate natural materials, but they are made by human hands (as opposed to extruded through our skin—yes, human hair can be spun, and it happens accidentally quite a lot when a piece of your hair falls onto the fiber you're spinning). Regenerated or manufactured fibers that start with natural products such as bamboo, soy, or milk, for example, are not usually included in the natural fiber category because of the processes that they have to go through to become fiber suitable for spinning. The term *natural fiber* refers to fibers that come *directly* from plants or animals.

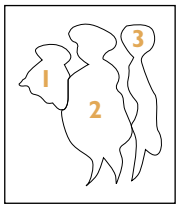
Plant fibers can grow off a seed (such as cotton), from the stem of a plant (such as flax or hemp), or even from the bark of a tree (such as the Western red cedar). Animal fibers come from the hair of animals such as sheep, dogs, llamas, bison (you get the idea—pretty much anything hairy is spinnable), but animal fibers also include the silk spun by worms and spiders—the most common is the silk from



Sheep wool:
1. Masham,
2. Merino,
3. Black Welsh Mountain,
4. Norwegian,
5. Icelandic.



Camelids: 1. Camel, 2. Alpaca, 3. Llama.



Silk: 1. Silk noil, 2. Tussah, 3. Bombyx.

Bombyx mori silkworms. (And yes, you can spin spiderwebs—it is just hard to cultivate spider silk.)

Plant fibers are composed of cellulose, while animal fibers are composed of protein. These chemical and structural differences mean that cellulose and protein fibers react differently when they are exposed to heat, water, soap, and dyes. Whereas extreme temperature changes can cause some protein structures to become permanently interlocked—as in felt—plant fibers can go through the same processes suffering no damage.

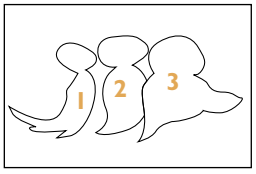
Plant and animal fibers also react differently to pH levels. Protein can be damaged by high pH levels (alkaline—think baking soda), but respond well to low pH levels (acid—think vinegar). Soda ash is alkaline and is a common water softener used in many laundry detergents. This is why, when washing wool and other protein fibers, most people encourage the use of wool-safe detergents and a vinegar rinse. Cellulose and protein fibers take dye differently. In most cases, fiber-reactive dyes are used to dye cellulose fibers, and acid dyes are used to dye protein fibers. ⌘

Amy Clarke Moore was the editor of *Spin·Off* magazine. Years ago, when she was an art student at Cornell College, Mt. Vernon, Iowa, she spent quite a bit of time making sculptures using dryer lint—that was before she learned how to spin. Fortunately, they were lost to the dustbins of time.

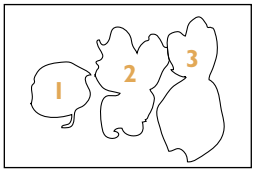
Resources

McCuin, Judith MacKenzie. *The Intentional Spinner: A Holistic Approach to Making Yarn.* Loveland, Colorado: Interweave, 2009.

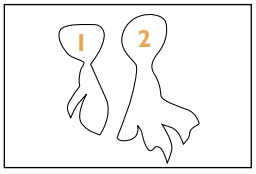
Goat: **1.** Cashgora, **2 and 3.** Cashmere,



Seed fibers: **1.** Cotton boll, **2.** Cotton, **3.** Colored cotton.



Bast fibers: **1.** Flax, **2.** Hemp.



We photographed some fibers we had on hand. The list is nowhere near exhaustive—it just provides an introduction to natural fibers.

Old Versus New Natural Materials

Production details of "new" manufactured fibers are proprietary and may differ from one company to the next. To avoid leaking trade secrets, little information is made available. But these spinnable fibers go through the same general process. The raw materials are usually leftovers from other manufactured products and considered waste that would typically be thrown out.

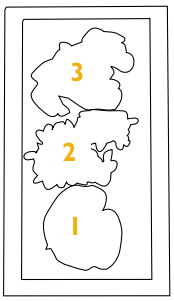
Wood pulp (rayon or lyocell), beech wood (Modal), bamboo, corn, seaweed, and soy beans can all be made into spinnable fibers through a process of turning the raw mulch into a liquid, either with heat or chemically, and then forcing the liquid through a nozzle with tiny holes; the liquid must then cure to a solid fiber. Although this may seem quite labor-intensive, it is a process that can be mechanized more easily than the retting of hemp or flax fibers.

Bamboo is a giant grass that can grow over one foot per day in good conditions. Today corn is used in everything from fuels and alcoholic beverages to adhesives and paper plates.

Fiber	Washing	Advantages	Disadvantages
Hemp	Machine wash/dry.	Doesn't mildew.	Requires special permits from the DEA (Drug Enforcement Administration) to be grown in the United States.
Flax (linen)	Machine wash/dry.	2 to 3 times stronger than cotton, highly absorbent, conducts heat away from the body.	Repeated folding along the same crease lines will cause the fibers to break; zero elasticity, so it wrinkles.
Rayon	Dry-clean or handwash.	Shimmer and drape, tightly plied it resists pilling.	Can shrink or stretch.
Bamboo	Handwash, air-dry.	Highly renewable resource, strong and flexible, soft, breathable, insulates, naturally antibacterial.	Achieving subtle colors when dyeing is difficult.
Corn	Machine wash.	Resistant to UV rays, wicks moisture, wrinkle resistant.	Will melt at temperatures above 300°F.
Lyocell	Dry-clean, handwash, or machine wash.	Strong, soft, absorbent, drapey, wrinkle resistant.	More expensive than cotton or rayon.
Modal	Dry-clean, handwash, or machine wash.	Ideal for blending with cotton, softer than cotton, durable, does not allow lime buildup, won't stretch or shrink.	Should be ironed after washing.
Seacell	Handwash.	Earthy smell, seaweed extracts promote healing of skin inflammations.	Earthy smell, currently only available combined with silk.
Soy fiber	Handwash.	Soft, drapey, breathable, absorbent, wrinkle resistant, antibacterial.	Can halo.

Colored Cotton

BY CAROL HUEBSCHER RHOADES



Colored cotton: 1. boll; 2. seeds; 3. lint.

Until very recently, the mention of colored cotton was met with skepticism. Most people believe that cotton is only white; however, natural-colored cotton has been around for at least four millennia. Colors ranging from pale tan to rich red-browns were propagated in Central and South America, the Caribbean, Africa, and India. Other colors, such as shades of rose, blue, and green, have been noted, particularly in Peru.

For the past two centuries, the fate of colored cotton has been determined by economic factors. Longer staple white cottons are easier to spin, dye, and process industrially than are colored cottons. White cotton is smoother and silkier than most colored cotton and thus more desirable and exclusive. Despite the dominance of white cottons (there are many varieties of the cotton genus *Gossypium),* wild and cultivated brown cottons have persisted in some areas. Sally Fox is generally considered the most important person in the modern revival of colored cottons (read her story at www.vreseis.com). During the 1980s and early 1990s, she successfully marketed natural colored cotton fiber, yarn, fabric, clothes, and bed coverings. She then closed most of her operation following complaints from commercial growers of white cotton about possible cross-pollination and contamination. Colored cotton is back in vogue, and Peru now supplies much of the fiber and products. It isn't just the colors, though, making it desirable. Commercial white cottons are grown and processed with very high amounts of chemical fertilizers and defoliants. Colored cotton plants are more pest resistant, can be grown as perennials, and are often grown organically. Colored cotton production and processing also provides fair-trade income for indigenous peoples. Beautiful natural colors, low-impact growing and processing, and a decent livelihood make for an economically viable product for a niche market.

FIBER CHARACTERISTICS

After spinners delight in the wonderful hues of colored cotton, they moan when they check the staple. I've seen it as short as ¼" and as long as 1 to 1¼". From my experience (and that of Lynn Teague, archeologist and cotton specialist), usually the darker the color, the shorter the fiber. The shorter fiber can also be coarser but not always. Some colored cottons have been crossed with longer white varieties, with resultant longer staples. Try samples from various sources and/or blend cottons to find the color, length, and softness you prefer. Natural-color cottons have the same basic qualities as white cottons. Cotton absorbs and wicks moisture, so you and the fabric will feel dry even when the fabric contains 20 percent of its weight in moisture. Cotton is easy to wash and comfortable to wear. Unlike wool, it is stronger when wet but can be weak when dry. The colored cotton industry is still in the early stages of revival, and plants are being bred and selected for various qualities. We may soon

Sample 3: Swatch knitted in Lattice pattern using eleven colors of cotton: **1.** Peruvian Organic "Camote." **2.** Foxfibre green. **3.** Rhoades home garden. **4.** Cotton Clouds light brown. **5.** Guatemalan. **6.** Stephenie Gaustad. **7.** Foxfibre red-brown. **8.** Foxfibre "Oatmeal." **9.** Cotton Clouds medium brown. **10.** Peruvian Organic "Avocado." **11.** Foxfibre light red-brown.

find softer and longer colored cottons more readily available.

PREPARING COLORED COTTON

Since most colored cotton on the market for handspinners is already processed into sliver or roving, no preparation is needed. Predrafting isn't necessary and will result in little shreds of roving because the fiber is so short.

If you have some cotton lint (the fibers surrounding unprocessed cotton seeds), remove the cotton seeds, if necessary, by pulling the fiber away from the seeds, or if you want to blend colors from rovings, card the fibers very gently on cotton cards. If you have wide cotton cards, it is easier to manage the carding if you spread fiber only in the center third (about 3" across) of the card.

Spread a fine layer of cotton near the front edge (the edge with the handle is the back edge) of the card and then another row behind that. I lightly catch the fiber onto the card teeth with a fingertip of one hand and pull forward from the roving with the other hand to thin out the fiber mass. Thin layers will be much easier to card efficiently. When carding, just float the top card over the bottom one. If the teeth of the card mesh, it will embed the fiber into those fine and closely set teeth, and you'll have to dig out the fiber. Most lint has some vegetable matter in it and little noils, so don't keep carding in hope of a smooth sheet of fiber. Transfer the fibers from card to card a couple of times and roll the fiber into a rolag or puni when the cotton is relatively smooth and evenly spread across the card.

SPINNING AND PLYING COLORED COTTON

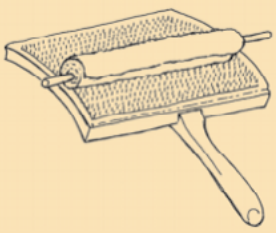
Before you spin cotton on a wheel, prepare the wheel. Select a wheel with high-speed ratios, oil the wheel well as per manufacturer's directions, and put on a small whorl. If your wheel accommodates various drive bands, use a fine cotton cord band to lessen the tension on the wheel. Adjust the tension on the wheel so that it just barely draws in. You'll have to add tension as the bobbin fills but add tiny amounts at a time. I can usually hear a smooth whirring when the bobbin has the right speed and tension for adding plenty of twist to the cotton, without pulling in the yarn too fast.

As for spinning any fine, smooth fiber, twist is the key. Check the amount of twist early and regularly by pulling on a section of yarn. Some colored cottons have very short staples and the yarn may feed onto the bobbin but will shred when you remove it if there isn't enough twist holding it together. If you have trouble getting enough twist into the fiber, either change whorls, treadle faster, or pinch off at the fiber end and treadle a bit more before letting the yarn go onto the bobbin. Keep the same extra treadle count throughout for an even yarn. Resist the urge to reattach little lengths that break off while spinning. If you have many breaks, then you need to evaluate your spinning method and wheel.

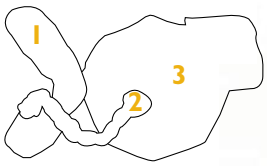
I like to spin from the end of a rolag, puni, or sliver with either a short backward point-of-contact draw

Rolling a puni

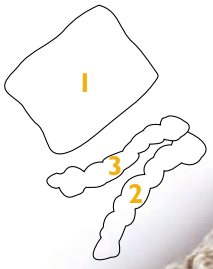
After carding the fiber, position a smooth ¼" diameter or smaller dowel (I use a smooth round chopstick) at the front edge of the carder and roll it toward the handle. To start the roll, use the side of your hand to catch the fiber ends against the dowel. After rolling up the fiber, I return the dowel to the front of the carder and roll it toward the handle again with a slight amount of pressure (not too much or you'll damage the teeth) to firm up the fibers. Roll in only one direction so the fibers remain aligned. Pop the puni off the dowel by pushing it up from one end.



Sample 1:
1. Organic cotton top "Candlelight" purchased from Little Barn.
2. 2-ply Z-singles, S-ply, 400 yards per oz, 40 wraps per inch. **3.** Lace octagon and square.



Sample 2:
1. Soap holder.
2. Vreseis sea green and white (with a stripe of green) cotton sliver with 1" staples.
3. Yarn—note the green has been darkened by boiling.



(the twist goes almost but not quite into the fiber mass) or by double drafting. Short forward draw is not recommended as it is usually nerve-wracking, hard on your back as you hunch over the short fibers, and very likely to make the roving disintegrate.

It is always tempting to take shortcuts with cotton spinning and especially plying. Even though I know plying a highly twisted singles from spinning wheel bobbins directly after spinning is frustrating and counterproductive because of the active twist, I thought that plying from the charkha spindles with the yarn fairly tightly wound on would be easier. Not! I then decided to lightly steam the thread by suspending each spindle over a kettle of boiling water. One spindle promptly fell in. I fished it out carefully and did what I should have done to begin with—I wound the thread from the spindle onto the skein winder. The thread dried quickly, and I was able to ply it with that on the other spindle. The twist had set on the yarn that got the brief steam bath so my idea could work, provided the spindles are rust resistant and stay put during the steaming. Otherwise, I recommend that you set the twist first by winding the cotton thread onto a short PVC pipe with holes in it and boil that for 30 minutes with a dash of dish soap. Boiling darkens the natural cotton color so test the process on a swatch or sample before boiling all the yarn for your project. You can also wind the singles onto a plastic niddy-noddy and carefully steam the thread.

Natural cotton colors are beautiful on their own, but if you can't find the colors you want, don't be afraid to blend two colors or make shades of one color by adding percentage amounts of white. Since boiling colored cotton usually darkens it, if you spin the cotton and divide the yarn into two skeins, but boil only one and steam the other, you'll have two shades. You can also make short-staple cotton easier to spin by blending in about 25 percent long-staple white cotton. Blending cotton with other fine, short fibers such as camel, angora, fine wool, and silk cocoon strippings not only makes cotton easier to spin with less twist but offers a lovely variety of textures and colors.

SAMPLE 1

The very pale tan (Candlelight) organic cotton top, with fibers 1 to 1¼" long, that I bought from Little Barn reminded me of old cream-colored coverlets. I quickly found a knitted design in *Weldon's Practical Needlework*, one of my favorite sources for lace patterns. The openwork pattern suggested needles equivalent to either a U.S. 0 or 00, so I knew I needed a fine thread.

To ensure enough twist in the fine strands, I spun the Z-twist singles on my Bosworth attaché charkha with a 110:1 ratio. I used a point-of-contact draw and drafted back just barely ahead of the twist so

that the yarn would not be too thin. After drafting out an arm's length, I pinched at the point between the fiber and the yarn, turned the wheel three times, and then wound on.

For the S-twist two-ply, I tried it on the charkha, having wondered why I had never seen instructions about how to do this. I soon discovered that the threads did not feed easily for plying from the built-in lazy kate and that the spindle wasn't appropriate for the heavier plied thread. I sought advice on two DVDs about charkha spinning (see Resources) and was relieved to see that both recommend plying on a wheel or regular spindle. Plying on my Timbertops Irish castle wheel (19:1 ratio) was quick and easy, although I checked periodically to be sure enough twist was inserted. After knitting a square, I decided to add more twist. I wound the 100-yard skein, weighing ¼ ounce and measuring 40 wraps per inch, onto a plastic niddy-noddy for steaming to set the twist (boiling would have darkened the color).

Knitted Pattern for a Quilt Square

Pattern adapted from "Weldon's Practical Knitter, Thirteenth Series," *Weldon's Practical Needlework*, Vol. 5 (Loveland, Colorado: Interweave, 2001). This little square is placed between large octagons that are the coverlet's main motifs. If you knit the octagons, note that there is an error in the pattern, an extra (yo, k2tog) in row 18 that should be eliminated.

With U.S. size 00 (1.75 mm) double-pointed needles, cast on 8 sts and divide them 2–2–4 over three needles.

Round 1 and all odd-numbered rounds: Knit.
Round 2: *Yo, k1; rep from * around.
Round 4: *Yo, k3, yo, k1; rep from * around.
Round 6: *Yo, k5, yo, k1; rep from * around.
Round 8: *Yo, k7, yo, k1; rep from * around.
Round 10: *Yo, k4, yo, k2tog, k3, yo, k1; rep from * around.
Round 12: *Yo, k3, k2tog, yo, k1, yo, ssk, k3, yo, k1; rep from * around.
Round 14: *Yo, k3, k2tog, yo, k3, yo, ssk, k3, yo, k1; rep from * around.
Round 16: *Yo, k3, k2tog, yo, k5, yo, ssk, k3, yo, k1; rep from * around.
Rounds 18 and 19: Purl, increasing 1 st at each corner.

Bind off loosely in purl. The piece is 2½" square.

Sample 2

I like using handknitted cotton washcloths but usually knit them with commercially spun cotton yarn. Spinning and plying a cable yarn is time-consuming but worth it in the long run for the added durability. To sample the effects of single color and tweed cable yarns, I designed a soap holder in two colors.

The Vreseis sea green sliver and the top that was white with a sea green stripe both had 1-inch staples. For each yarn, I spun four strands on my Timbertops Irish castle wheel with a 21:1 ratio. Luckily, the bobbin already on the wheel was half-filled with another yarn. That weight lessened the draw-in tension on the wheel. I divided the fiber into four lengths and spun each one after the other, changing hooks at the end of each length. I spun by double drafting, frequently adjusting the tension for easy take-up and making sure there was enough twist in the yarn.

After spinning the Z-twist singles, I resisted the temptation (great as it was) to ball each segment for plying. Instead, I released the tension on the bobbin whorl and wound the thread onto a plastic niddy-noddy. I broke the thread at each segment and tied it to the previous one so it would be easy to find the dividing lines when later winding each segment into a ball on a nøstepinne after steaming the yarn on the niddy-noddy to set the twist.

Cable yarns are plied in two steps. Two sets of two-ply yarn are produced first (S-twist) and then those two are plied with Z-twist. I plied on the Irish castle wheel with the waste yarn still on. To attach the strands for plying S, I pulled out a 1-yard length of the waste Z-twist singles, doubled it, and knotted it at the bobbin end. I slipped the strands to be plied into the loop at the other end.

After plying the yarns, I skeined each again and set the twist by gently boiling the skeins for 30 minutes. To help the cotton submerge in the water, I added a dash of dish soap. The green darkened as is usual with natural-colored cottons. The yarns measured 16 to 17 wraps per inch. I spun a total of ¾ ounce with 32 yards green and 31 yards white.

A cigar-box charkha is a portable spinning tool—perfect for spinning cotton on the go.

The dried yarns felt rather stiff, but they softened up as I knitted, especially the green one. I worked each side of the bag separately and knitted back and forth on U.S. size 3 needles. After 7½ pattern repeats, I changed to crochet hook U.S. size D and worked a row of single crochet across and then shrimp stitch back (shrimp stitch is single crochet worked from left to right). I finished the bag by seaming the sides and bottom and then sewing on two rustproof snaps to close the top edge. I still can't decide which color I like best so will have to make a washcloth of each.

Scotch Stripe Pattern adapted from "Weldon's Practical Knitter, Twenty-Sixth Series," *Weldon's Practical Needlework*, Vol. 9 (Loveland, Colorado: Interweave, 2003).

Cast on 24 sts.

Blend cotton with other fine, short fibers such as camel, angora, fine wool, or silk cocoon strippings to make the cotton easier to spin.

Rows 1 and 4: Sl 1 knitwise, k2, p6, k2, p2, k2, p6, k2, p1.
Rows 2 and 3: Sl 1 knitwise, p2, k6, p2, k2, p2, k6, p3.

SAMPLE 3

There are many colors and shades of colored cotton, so I knitted a sampler to show off some of the variety. I also wanted to test-drive a new lightweight (¾-ounce) spindle from Greensleeves Spindles—the Damsel Monique top-whorl spindle. Some of the fibers were in sliver form, others were batts or even cotton still on the seed (from my garden). To make a smoother yarn from the batts and to make all the yarns as similar as possible, I quickly handcarded the cotton on my child-size cotton cards and rolled each batt into a puni for easy spinning (see Rolling a puni on page 8).

For each color, I carded ten punis and spun them by double drafting on the Greensleeves spindle. The spindle holds the spin for a long while, so it wasn't hard to double draft and get enough twist into the yarn. I spun about an arm's length and then wound on. When I spun a longer yarn, it tended to thin out a bit, and I didn't want a fine, fine yarn. I spun the yarns one after the other, alternating light and dark so I could tell where each color ended.

I let the singles sit on the spindle for a day to set the twist in the warm, humid Texas spring air. I wound each color into a ball on a nøstepinne (this makes a center-pull ball that doesn't collapse) and plied the yarns on the Monique spindle. I noticed that when I plied an extra long length and then caught it under my elbow to keep the yarn from tangling, the yarn tended to break at the point where plying stopped. The problem was solved by plying shorter lengths before winding onto the spindle. The yarns averaged 105 yards per ounce and 20 to 22 wraps per inch.

On the sampler, the darkest color is Camote, a Peruvian organic cotton; this is followed by Foxfibre green, brown from my garden, Cotton Clouds light brown, Guatemalan, Stephenie Gaustad's cotton, Foxfibre red-brown and Oatmeal, Cotton Clouds medium brown, Peruvian Avocado, and Foxfibre light red-brown. The knitting pattern is Lattice from "Weldon's Practical Knitter, Fourteenth Series," *Weldon's Practical Needlework*, Vol. 5 (Loveland, Colorado: Interweave, 2001). I knitted the sampler on U.S. size 2 needles. I started and ended with 3 knit rows and then worked the pattern following the original instructions. I also slipped the first stitch of each row knitwise.

Lattice Pattern (repeat of 6 + 5)

(Original instructions have been "translated" into contemporary U.S. knitting language.)

Rows 1 and 3: Knit.
Rows 2 and 4: K3, purl to last 3 sts, k3.
Row 5: K3, *yo, sl 1, k3, pass the slipped st over the three knitted sts; put the 3 knit sts back on left needle and draw the next st to the left over them; place the 3 knit sts back on right needle; yo, k1; rep from * until 2 sts remain, end k2.
Rows 6, 8, 10, 12: K3, purl to last 3 sts, k3.
Rows 7 and 11: Knit.
Row 9: K3, k2tog, *yo, k1, yo, sl 1, k3, pass the slipped st over the three knitted sts; put the 3 knit sts back on left needle and draw the next st to the left over them; place the 3 knit sts back on right needle; rep from * until 6 sts remain, end yo, k1, yo, ssk, k3.

Repeat Rows 5–12 as often as desired and then bind off. ⌘

Carol Rhoades of Madison, Wisconsin, has enjoyed spinning cotton ever since she learned from Harry Linder that holding the fiber at the right angle from the cotton support spindle makes all the difference.

FIBER SOURCES

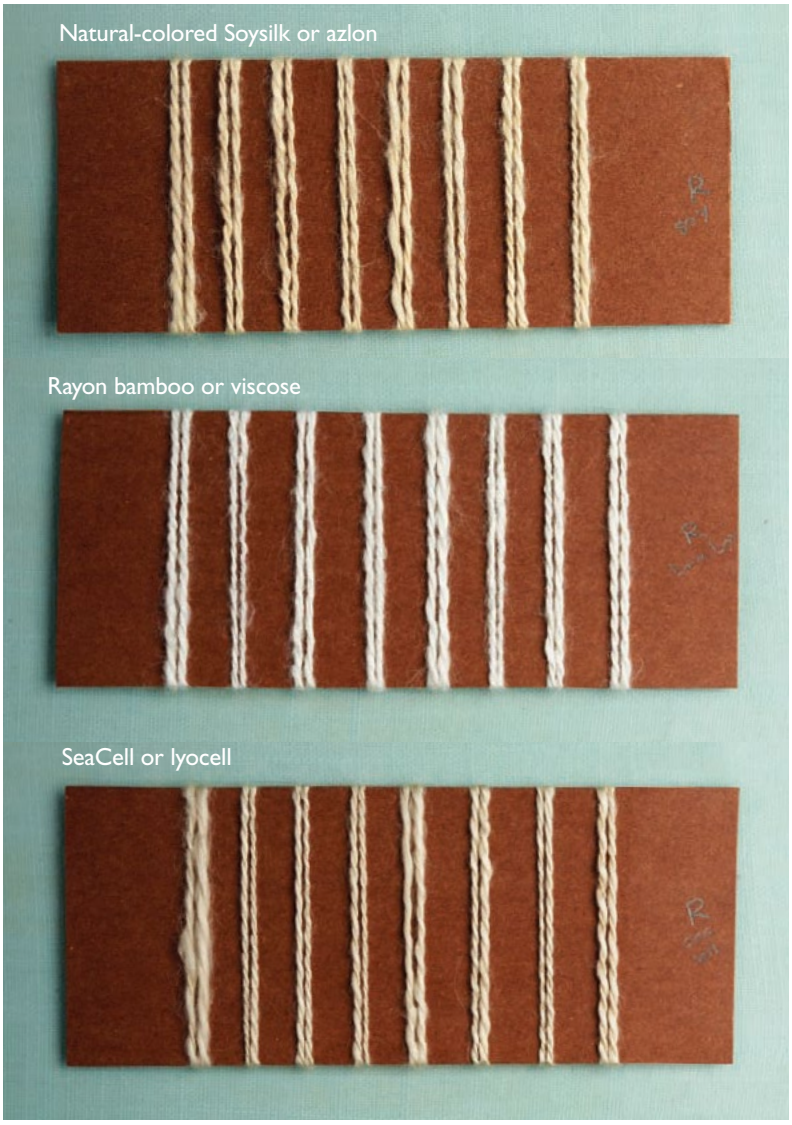
Cotton Clouds Inc., 5176 S. 14th Ave., Safford, AZ 85546; (800) 322-7888; info@cottonclouds.com; www.cottonclouds.com.
Little Barn, 133 McKee Rd., Harvest, AL 35749; (888) 243-4237; www.littlebarninc.com.
Peru Naturtex Partners, www.perunaturtex.com.
Vreseis Limited, PO Box 69, Guinda, CA 95637; (530) 796-3007; info@vreseis.com; www.vreseis.com.

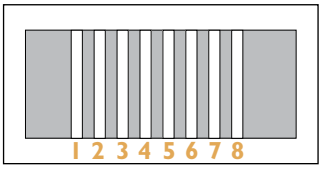
RESOURCES

Benfatto, Elaine. *Charkha Spinning: Tips and Techniques*. East Burke, Vermont: Copper Moose, 2002. DVD.
Casey, Maggie. "Spinning Basics: Double Drafting: Spinning Short, Fine Fiber into Lofty Yarns," *Spin·Off* 31, 1 (Spring 2007), 30–32.
DeRose Mason, Lynn. "Spinning with a Supported Spindle." *Spin·Off* 19, 1 (Spring 1995), 74–81.
Durham, Ann. "My Cotton Shirt Start to Finish," *Spin·Off* 28, 2 (Summer 2004), 50–52.
Hallman, Eileen. *Spinning Cotton on the Charkha*. Black Mountain, North Carolina: New World Textiles, 2003. DVD.
Holbrook, Jill. "Spinning Cotton for a Mimbres Tee: Kicking One Habit Leads to Another." *Spin·Off* 28, 4 (Winter 2004), 38–42.
Linder, Olive, and Harry P. Linder. *Handspinning Cotton*. Phoenix, Arizona: Cotton Squares, 1977.
Pulliam, Deborah. "Natural Cotton Colours and Vreseis: What Will Prevail?" *Spin·Off* 21, 3 (Fall 1997), 26–27.
Rhoades, Carol. "Handcarding with a Light Touch, Or How to Make Perfect Rolags," *Spin·Off* 25, 3 (Fall 2001), 74–79.
Teague, Lynn S. "The Colored Cottons of Peru." *Spin·Off* 22, 1 (Spring 1998), 57–61.
Vreeland, James M. "The Revival of Colored Cotton." *Scientific American* 280, 4 (April 1999), 112–118.

How to Finish Manufactured Fibers
Viscose, Lyocell, & Azlon

BY BETH SMITH





Samples 1 through 4 were spun from the fold, long draw, and samples 5 through 8 were spun short forward draw. **1.** unfinished yarns, **2.** hot/cold bath, **3.** hot bath and vinegar rinse, **4.** steamed, **5.** unfinished yarns, **6.** hot/cold bath, **7.** hot bath and vinegar rinse, **8.** steamed.

I'm a wool girl, and everyone who knows me knows it. As a spinning teacher, though, I think it is important to be able to answer questions and give advice about a wide variety of fibers. All of these new manufactured fibers were a mystery to me. They are shiny to be sure. I do like them in blends for the luster and strength they bring to the finished yarn. I wasn't sure what to make of them on their own, but I continued to be curious about them.

HOW THEY ARE MADE

Regenerated proteins are protein fibers that have been broken down from their original form and reassembled into fiber structure again. I chose to spin three of the regenerated fibers currently on the market: rayon bamboo (viscose), natural colored Soysilk (azlon), and SeaCell (lyocell). Viscose is made by regenerating cellulose, which is a stringy, fibrous substance that forms the main material in the cell walls of plants. Cellulose in the human diet is more commonly known as fiber. The viscose process was originally created to mimic the process used by silkworms to make silk. The manufactured plant material is crushed and goes through a sort of digestive process with chemicals and chemical baths until finally it is reduced to a viscose solution that can be forced through a spinnerette into a vat of another chemical that hardens the solution into fibers, which are then spun using traditional methods that would be used for any slippery fibers.

The lyocell process, which is also a regenerated cellulose process, is more environmentally friendly than the viscose process because it uses chemicals that may not be as harsh, and 99 percent of both the chemicals and the water used in the process are recycled. Azlon is made by regenerating proteins through a process very similar to that used for viscose production.

Bamboo (viscose) is currently available in several colors. The other fibers are usually only available

in white or ecru but independent dyers are experimenting more and more with dyeing them.

HOW SHOULD I FINISH THE YARNS?

Because of the similarity in processing, I thought that the three fibers should act similarly during spinning and finishing and in the fabric, and I found out that they do. I knew I could make yarn out of the fibers but hesitated to do it because of my biggest question: How should I finish the yarns? Maybe that sounds like a crazy reason not to go ahead, but I've come to a point in my spinning where I am spinning for a purpose. With wool, I've settled on my techniques and favorite ways to do things, but these fibers baffled me. Despite everything I read I couldn't find detailed advice on finishing yarns spun from regenerated fibers. Should these manufactured fibers be finished like silk yarn? Could I use the same techniques as for wool? Did I need to be gentler or more assertive?

In *Spin Control* (Interweave, 2008), Amy King recommends finishing the yarns the same way as silk yarns—with steam, while in *The Intentional Spinner* (Interweave, 2009), Judith MacKenzie McCuin suggests finishing any worsted yarn with a hot soak and tepid rinse. Sampling and experimenting seemed the way to go.

I decided to spin six samples of three regenerated fibers. One of each fiber type would be spun in a worsted manner using short forward draw, and one of each would be spun from the fold with a supported long draw. By spinning each fiber with two methods, I could determine whether or not the spinning technique affects the final product. Based on my experience with the fibers, I figured that I would be able to make educated guesses about how other regenerated fibers would behave for future spinning projects.

SPINNING

The staple length of azlon and lyocell was about 5 inches, and the viscose was about 3 inches. The fibers are cut to these lengths in the manufacturing process to make them easy to blend with other fibers, and fiber lengths can vary depending on the source. My favorite of the three to spin was the lyocell, which felt the most like tussah silk to me. My least favorite was the azlon, which felt most unorganized and was difficult to manage.

I learned several things about these fibers while spinning, and one of the most important things was not to expect them to handle like wool. Previous experience spinning silk helped a little with technique, but the manufactured fibers handled a bit differently than silk.

Even though a short forward draw allowing no twist to enter the fiber supply is my favorite drafting method with many animal fibers, I don't recommend it for these manufactured fibers. I found it difficult to get a smooth, consistent yarn this way. The fibers felt sticky and slippery all at the same time. I decreased the wheel tension to the very limit of low so that the fiber didn't feel like it was slipping away from me. I also found it difficult to keep the fibers lined up, especially with the azlon—the fibers always wanted to be scooting this way or that, trying to escape from the group, and the plied yarns were not smooth or consistent in thickness.

On the other hand, spinning these fibers from the fold was much more manageable. I pulled off a 4- to 6-inch length from the end of the top and folded it over my index finger. I always pull off more than a staple length to spin short fibers from the fold because I find a 3-inch bit of fiber a little difficult to hold onto. As soon as I got the fibers joined to the spun yarn, I removed my finger from the fold because that made it easier to maintain control. As with spinning any fiber from the fold, the key was a very light touch. It seems counterintuitive, but the light hold allows for a more consistent and smoother yarn. When spinning the singles, I aimed to have about the same amount of twist I would put in any yarn from fibers with a 3- to 5-inch staple.

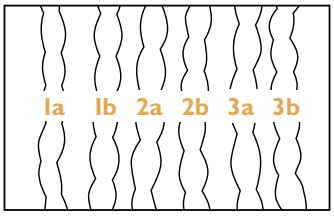
Plying required a lot more twist than I expected, and although the yarn looked like it had plenty of twist as it fed onto the bobbin, it wasn't enough. I had to run several of the samples through the wheel again to add more twist. Another thing I had to look out for in the plying was even tension on both strands as I moved the yarn toward the orifice. Due to the slipperiness of the fiber, one strand can slip along the other making more of a wrapped yarn than a plied yarn in places. Once I figured these things out, I was off and running.

In the semiwoolen yarns, as would be expected, the luster was cut down slightly for all the fiber types when compared to the worsted-spun yarns right after spinning. I still wasn't sure what would happen in the finishing of the yarns.

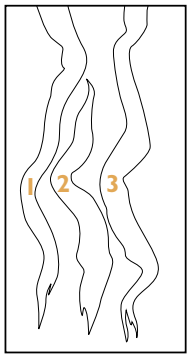
FINISHING

I experimented with three finishing methods. I used a hot/cold bath with a little Unicorn Fibre Wash for one group of yarns, a warm bath with a water/vinegar rinse for the next group, and a short time in the vegetable steamer for the third group.

I soaked the first group of yarns for 5 minutes in the hottest water I could get from the tap



Skeins labeled (a) were spun from the fold, long draw, and (b) were spun short forward draw. **1a and b:** SeaCell (lyocell); **2a and b:** natural-colored Soysilk (azlon); and **3a and b:** rayon bamboo (viscose).



1. Rayon bamboo (viscose), **2.** SeaCell (lyocell), and **3.** Soysilk (azlon) top.

and then plunged them into cold water for less than a minute and back to the hot and once more into the cold. I then squeezed the water out in a towel and laid the skeins out to dry. This technique mimicked how I finish some of my wool yarns. I did not whack or abuse the yarn in any way other than to give the skein a good snap between my wrists because I know that viscose fibers are weaker wet than dry.

The yarns in this first group all felt a little stiff and crunchy while wet, just like some viscose clothing I've had feels right out of the wash. They dried within a couple of hours and were drapey and soft to the touch. It is difficult to tell without the labels which yarns were spun with each drafting technique. They all had about the same luster and loft.

I soaked the second group in warm water for 5 minutes and then put them in a warm rinse with a glug of white vinegar. I squeezed out the excess water in a towel and laid them to dry with the others. I used a vinegar rinse because that is what I do with some silk yarns; the vinegar neutralizes the soap and helps preserve the color and shine of silk. Why not try it with manufactured yarns?

Again, the water made these yarns feel stiff and crunchy while they were wet but, as for the first group, they dried nicely, and the yarns all look similar as far as luster and loft.

I put the third group of skeins in the vegetable steamer for 10 minutes. This finishing method is my favorite. The yarns all plumped up and were very soft and drapey right out of the steamer. They were slightly damp from the steam but dried very quickly. These yarns felt a little softer and had less shine than the wet-finished yarns.

As I had suspected, all three of the manufactured fiber yarns reacted the same way to each finishing technique, and I do like the finished yarns. They are drapey and soft and lustrous. They also are very strong—amazingly strong. In the end, I think I preferred the steamer for finishing only because I skipped the wet, crunchy point of the wet finishing. Honestly, looking at the samples, any of the finishing techniques appear to work well.

I am still a wool girl. That didn't change with these experiments. There are a few things, however, that might be attractive to spinners about these fibers. Many regenerated fibers are more affordable than the silk fibers they mimic, and the final yarns


Hot-bath yarns


Steamed-with-vinegar-rinse yarns

are beautiful. These fibers also offer alternatives to spinners with wool allergies. They can take dye well. All of the yarns I produced are strong when they are dry, but lyocell is the only one that retained its strength when wet. There are a variety of manufactured fibers on the market at the moment, including fibers made from milk protein and corn. Try some of them out. You might like working with them. Now where did I put that Wensleydale I was washing? ⌘

Beth is the owner of the Spinning Loft in Howell, Michigan. When she is not teaching spinning, she is up to her elbows washing fleece, spinning, knitting lace, or weaving. When all else fails, she turns to harassing her poor children and husband.

Resources

King, Amy. *Spin Control*. Loveland, Colorado: Interweave, 2008.

Kiplinger, Joan. *Meet the Azlons from A to Z: Regenerated & Rejuvenated,* http://www.fabrics.net/joan103.asp.

McCuin, Judith MacKenzie. *The Intentional Spinner*. Loveland, Colorado: Interweave, 2009.

Smith, Joyce A. *Lyocell: One Fiber, Many Faces*, http://ohioline.osu.edu/hyg-fact/5000/5572.html.

———. *Textiles and Clothing: Rayon—The Multi-Faceted Fiber*, http://ohioline.osu.edu/hyg-fact/5000/5538.html.

Manufactured Fibers Resource Directory

ARIZONA

Grandma's Spinning Wheel
6544 E. Tanque Verde Rd. #150
Tucson, AZ 85715
(520) 290-3738
www.grandmasspinningwheel.com

CALIFORNIA

Purlescence Yarns
586 S. Murphy Ave.
Sunnyvale, CA 94086
(408) 735-9276
www.purlescenceyarns.com

Urban Fauna Studio
1311 16th Ave.
San Francisco, CA 94122
(415) 664-1267
www.urbanfaunastudio.com

COLORADO

Table Rock Llamas Fiber Arts Studio & The DyeWorks
6520 Shoup Rd.
Colorado Springs, CO 80908
(866) 495-7747
www.tablerockllamas.com

ILLINOIS

The Fold
3316 Millstream Rd.
Marengo, IL 60152
(815) 568-5730
www.thefoldatmc.net

KANSAS

Yarn Barn of Kansas, Inc.
930 Massachusetts St.
Lawrence, KS 66044
(800) 468-0035
www.yarnbarn-ks.com

MAINE

Portland Fiber Gallery
229 Congress St.
Portland, ME 04101
(207) 780-1345
www.portlandfibergallery.com

MICHIGAN

Spinning Loft
123 Mason Road
Howell, MI 48843
(517) 540-1344
www.thespinningloft.com

NORTH CAROLINA

Gate City Yarns
231 S. Elm St.
Greensboro, NC 27401
(336) 370-1233
www.gatecityyarns.com

TENNESSEE

Smoky Mountain Spinnery
466 Brookside Village Wy., Ste. 8
Gatlinburg, TN 37738
(865) 436-9080
www.smokymountainspinnery.com

WYOMING

International Fleeces
2308 Sheridan St.
Laramie, WY 82070
(307) 742-3140
www.internationalfleeces.com

CANADA

Gemini Fibres
5062 Mt. Albert Rd.
Mount Albert, ON L0G 1M0 Canada
(800) 564-9665
www.geminifibres.com

Make One Yarn Studio
841 1st Ave. NE
Calgary, AB T2E 0C2 Canada
(403) 802-4770
www.make1yarns.ca

Fiber Basics:

YUCCA: A YUCKY PROCESS THAT YIELDS BEAUTIFUL RESULTS

BY ESTELLA FLATHER

Palm lily is a plant widely used for indoor decoration.

YUCCAS are succulent plants in the lily class. They are native to the Americas and occur throughout most of the southern and central United States. Many species are widely used for landscaping, as they are drought tolerant and easy to cultivate, while others native to more tropical areas, such as the palm lily *(Yucca elephantipes)* are grown as houseplants. Some yuccas have a tall, upright tree-like form, some have thick stems that sprawl along the ground, while others grow in stemless rosettes. The beautiful flowers produced in a tall spike are a decorative feature of the plant. Flowers and seedpods of the banana yucca *(Yucca baccata)* are edible.

Native Americans of the southwest United States have long used the fibers from yucca leaves for many products, including sandals, baskets, carry bags, and cordage. According to the authors of *Wild Plants and Native Peoples of the Four Corners,* "yuccas constitute the single most important noncultivated group of plants for prehistoric and con-

Safety precautions

Always add the soda ash to the water and not the water to the chemical. When mixing any chemical into water to create a solution, the dry ingredient should be gradually mixed into the water. Caustic chemicals can overheat dangerously if the water is added to the dry chemical because of the exothermic chemical reaction produced when the material first comes into contact with the water. Mixing the soda ash gradually into the water will ensure that there is a more diluted solution of soda ash and will avoid any chance of the solution overheating. Keep chemicals in properly labeled containers out of reach of children.

PHOTOS BY ESTELLA FLATHER

Spanish bayonet. White spikes of blossoms adorn these plants in Estella's backyard. Watch out for the spines!

Arkansas yucca has soft, bluish leaves, making it more suitable for yards where small children play.

temporary Indians living in the Southwest." Whole dried leaves are useful for weaving mats and baskets. Pounded yucca roots provide a mild soap that was used as shampoo and is still preferred today for the treatment of delicate fabrics. The fibers from fresh yucca leaves are prepared by boiling the leaves in an alkaline solution, then scraping the pulp from the fibers. The idea that the fibers were scraped clean with the artisan's teeth is discounted by archaeologists and fiber workers. The long stems of yucca plants were hollowed out by Native Americans and used as containers such as quivers. Slabs of yucca stem were used as the soles for sandals.

Agave leaves, which are much fleshier and longer than yucca leaves, produce the fiber known as sisal. Native Americans prepared agave fiber by placing the leaves over a bed of coals and covering them with sand, steaming them to make the pulp easy to scrape away.

Agaves are plants related to yuccas. Their fibers are called sisal. This variegated agave is growing at the Fort Worth Botanic Garden.

Types of yucca

There are many species of yucca that resemble one another so closely that it is difficult to tell them apart. This doesn't really matter for the craftsperson, as all the yuccas produce similar fibers. Some of the species I have experimented with are listed here.

Ponytail palm is another plant widely used as a houseplant whose fibers may be used whole for plaited work, or the fibers may be treated like yucca and spun.

- ***Yucca aloifolia*** or **Spanish bayonet.** This variety, as its name implies, has very sharp spines on the tips of the leaves. I would not recommend planting this one if you have small children, but if you want to discourage burglars, this is the perfect plant. This type produces beautiful spikes of flowers in early summer. To harvest the leaves, I snip off the sharp spines on the tips with scissors, then reach in to cut off the leaves. Mature leaves that are fully grown are best. Soft, newly sprouted leaves will not have formed strong fibers. Safety goggles and gloves are always a good idea when pruning and working around shrubs. When the plants have grown too lanky, I chop off the top and then chop off the stem close to the roots. To root the top, remove leaves from the base of the cutting and replant it. You don't need rooting hormone. The plant will resprout from the roots and the top will root, giving you two plants. This species ranges from Mexico north to Virginia.
- ***Yucca arkansana*** or **Arkansas yucca** is found from Kansas east to Arkansas and south to central Texas. This plant has soft, bluish-green leaves and no sharp spine on the tip. The less spiny types of yucca such as this one are more suitable for planting where small children may be playing. This plant stays compact without the sprawling stem of some species, but it is a slow grower.
- ***Yucca elephantipes*** or **palm lily.** The tropics of Guatemala are the native habitat of this plant. It is widely used as an attractive houseplant, with a swollen, woody stem and green clumps of leaves at the tips of the branches.
- ***Hesperaloe parviflora*** or **red yucca.**

Leaves boiled and ready for scraping.

Available in nurseries, this relative of the yucca is widely grown in landscapes.

- ***Beaucarnea recurvata*** or **ponytail palm** is a relative of the yucca native to Mexico and is frequently used as a houseplant. The narrow leaves may be used whole for plaited mats or baskets, or they may be treated as yucca and the fibers spun.

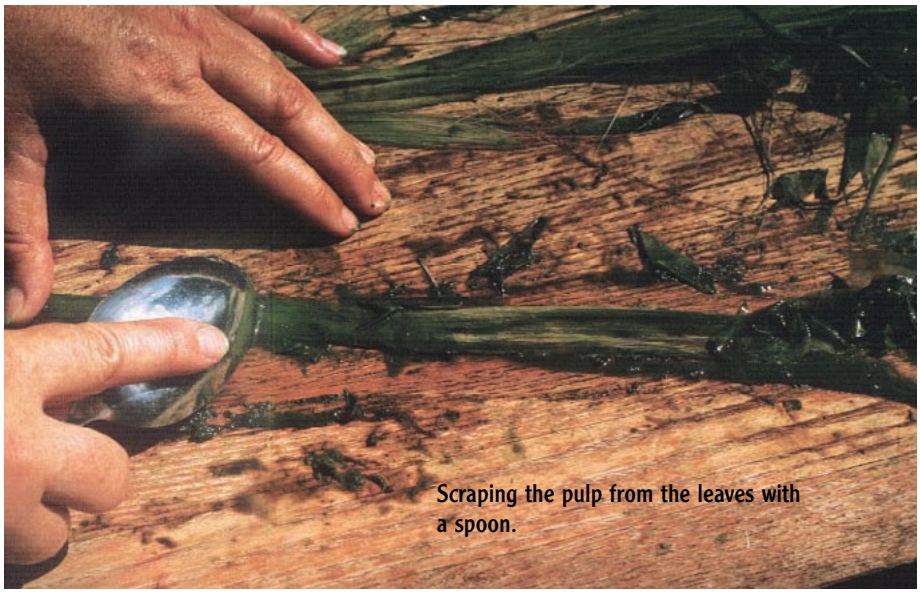
Keep in mind that you may not collect plants or plant materials from public lands such as national parks or roadsides. If you are collecting yucca leaves from private property, make sure that you have the owner's permission. Growing your own yucca plants will decorate your yard and give you access to your own source of fibers. In northern areas, many yuccas will survive if mulched in the winter and planted by a south wall of your home where they will get some protection from northern winds, or you can grow the types that make good houseplants.

Various types of yucca will have slightly different fiber characteristics. In general, those types with softer leaves need less boiling to prepare them for scraping, and the processed fiber will be softer. Varieties with longer and thicker leaves will need more boiling to soften them for scraping, but the fibers are longer and stronger. Experiment and see how the fibers from different types of yucca compare.

Preparing the fibers

Yucca fibers may be prepared by pounding the fresh leaves with a rock or hammer, then scraping the pulp from the fibers. This uses a lot of energy and time and really hurts your arm after a little while. An easier way to prepare the fibers is to boil the fresh leaves in alkaline water. This makes it possible to scrape the pulp away from the fibers without any pounding and makes the fibers stronger. It takes several hours of boiling to soften the pulp. I use a 5-gallon enamel canning pot for this. Keep the cooked leaves in the solution until you are ready to scrape them. Rita Buchanan, in her book *A Weaver's Garden* (Interweave Press, 1987), recommends leaving the leaves to rot for a week or more to soften the pulp. Before you scrape the leaves, rinse off the alkaline solution, which could irritate your hands. Native Americans used wood ash to produce the alkaline solution by soaking it in a bucket of water, then pouring off the water. Modern artisans may skip this step by buying soda ash (sodium carbonate), a chemical for balancing swimming pool pH. This chemical can be found at local hardware stores or garden centers. One-quarter of a cup of soda ash to several gallons of water produces an alkaline solution.

Once the leaves are cooked, the pulp is easy to scrape away using the edge of a large spoon. Native Americans probably used a shell, flint knife, or bone scraper to accomplish this. The process is messy, so you may want to scrape your leaves outside and wear rubber gloves. I place a piece of wood or a metal cookie sheet under the leaf so that there is a smooth surface to scrape against. I hold the leaf at one end, scrape the skin and



Scraping the pulp from the leaves with a spoon.

Various yucca leaves and their fibers. Left to right: 1) Large bundle of commercial sisal fiber; 2) Arkansas yucca leaf, pounded fiber, and boiled fibers; 3) Palm lily leaf and pounded fibers; 4) Red yucca leaf and pounded fibers; 5) Spanish bayonet leaf and bundle of fibers created by boiling and scraping, then bleaching.

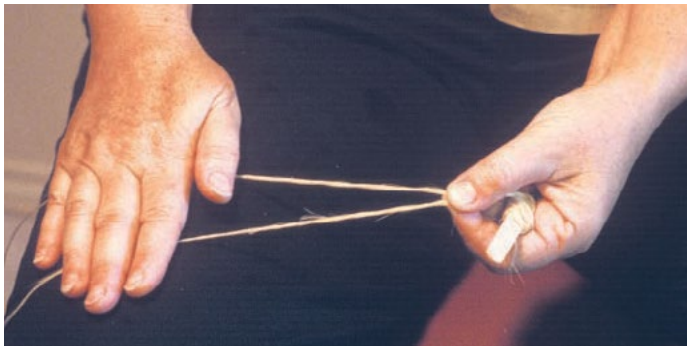
pulp off one side, and then flip the leaf over to scrape the skin and pulp off the other side. I then reverse the leaf end for end, and while pressing down on the already cleaned fibers, I remove the pulp from the other end of the leaf. Keep pressure on the fibers so that you don't lose too many along with the pulp. The more pulp you remove, the softer the fibers will be. Rinse the cleaned fibers. The fibers will be a greenish to tan color. If you want them to be white, soak them in a solution of one part bleach to ten parts water until they are white, and then rinse the bleach solution off. If you want to save the fibers to spin later, let them dry.

Spinning the fibers

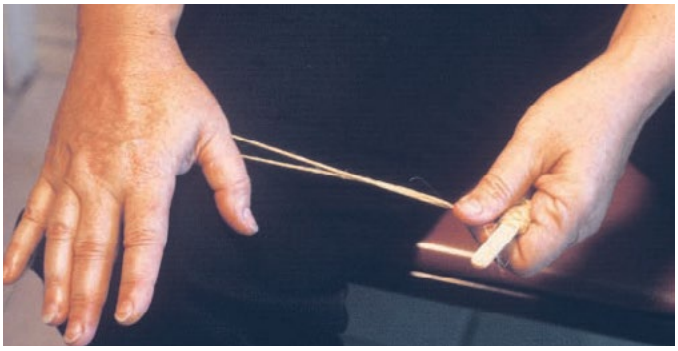
Yucca fibers should be spun while damp. You may use the still-damp fiber you have prepared, or you can soak the fiber in water before spinning.

Native Americans use a one-step, thigh spinning process to make their cord. Divide the yucca fiber into two groups. The amount of fiber depends on how thick you want your cord to be. Tie the bundles of fiber to a short stick with an overhand knot (a popsicle stick works well for this). While sitting down, hold the stick with the fiber in your left hand near your thigh. Keeping the two strands of fiber separate, roll each set of fibers down your thigh with your right hand. Then rotate your right hand to bring the two strands of fiber together. Roll the fiber back up your thigh in the opposite direction to ply the two strands together. Roll the newly created cord around the stick. Continue this process, adding in more fiber when necessary to extend the cords. It takes a lot of practice and some experimenting to learn this technique.

The yucca fibers may also be spun with a handspindle or spinning wheel and twined as a separate step. This process is similar to spinning other bast fibers such as flax. The fiber is separated into groups of strands; the number of strands will vary according to how thick a cord is desired. A group of fibers is tied onto a starter cord for the handspindle.

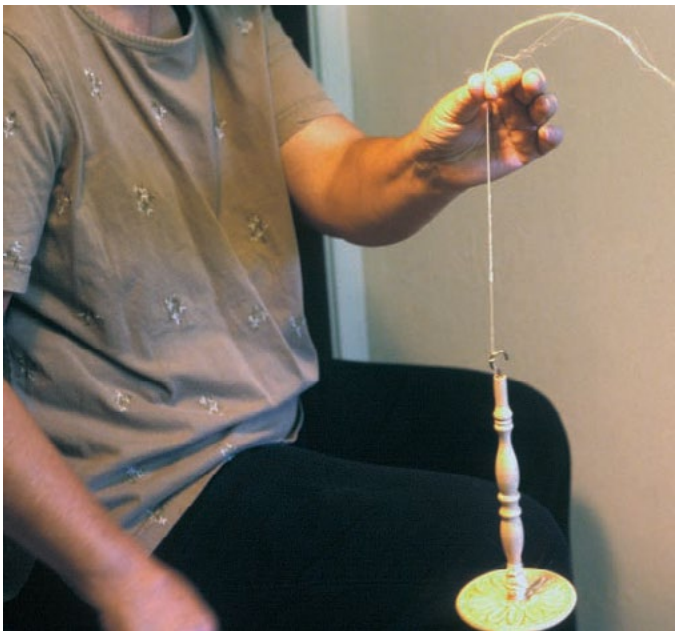


Spinning the fibers by rolling two strands simultaneously down the thigh.



Twining the spun fibers by reversing the motion on the thigh.

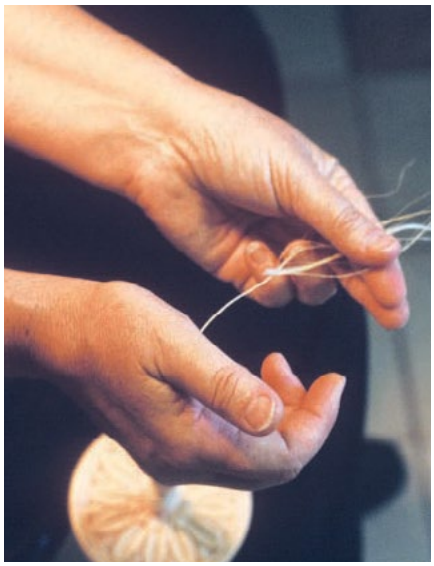
The twined fiber ready to roll onto the stick.



Yucca fiber can also be spun with a handspindle.

The fibers are spun until near the end of the fiber, then a new bundle of fiber must be spliced in, to continue the cord. Once the desired length of cord is reached, ply the cord the same way you would for any fiber. Now your yucca cord is ready to be used for weaving or basketry.

Yucca fiber is still in use today by Native American artisans for weaving baskets and making sandals and woven bags, just as it was by the ancient people of the American Southwest. Imagine the fun you can have growing plants to process and make into yarn!



Splice new fibers into the bundle of unspun fiber.

ESTELLA FLATHER *of Burleson, Texas, is a lifelong crafter who especially enjoys researching and re-creating historical arts and crafts. Her primary areas of interest are leathercraft, woodworking, and jewelry, as well as textile art, such as spinning, natural dyes, weaving, and embroidery. Estella teaches classes through the Extended Education Department of Texas Christian University and participates in many demonstrations of historical crafts as a member of an educational not-for-profit medieval reenactment group. While Estella enjoys studying the history of the American Southwest and greatly admires Native American arts, she is not of Native American descent.*

Resources

Buchanan, Rita. *A Weaver's Garden: Growing Plants for Natural Dyes and Fibers*. Loveland, Colorado: Interweave Press, 1987.

Campbell, Paul D. *Survival Skills of Native California*. Salt Lake City, Utah: Gibbs Smith, 1999.

Dunmire, William W., and Gail D. Tierney. *Wild Plants and Native Peoples of the Four Corners*. Santa Fe, New Mexico: Museum of New Mexico Press, 1997.

Graf, Alfred Byrd. *Exotica*. East Rutherford, New Jersey: Roehrs, 1976.

Vines, Robert A. *Trees, Shrubs and Woody Vines of the Southwest*. Austin, Texas: University of Texas Press, 1986.

Wills, Mary Motz, and Howard S. Irwin. *Roadside Flowers of Texas*. Austin, Texas: University of Texas Press, 1975.