

Spin·off Presents:

Weaving with Handspun





I love to weave with handspun yarn because weaving and handspinning are perfect partners—each bringing out the best in the other. Weaving is about structure and grids—perpendicular threads that intersect and overlap. And yet within the seemingly rigid structure of the loom, there are so many choices. Will you use plain weave or one of a myriad of 8-shaft pattern drafts? Will your fabric be weft-faced or warp-faced or balanced? What kind of tie-up will you use? And then there are the yarn choices.

Next to the structure of weaving, spinning can seem very organic. The choices handspunners face are nearly endless—you choose your fiber, color, texture, and grist. Do you want a fine, soft cotton or lustrous wool with a touch of silk? Do you want a thick and thin novelty yarn or a fine laceweight yarn? Are you going to keep the natural brown or dye your fiber to reflect the color of the heavens?

Wedding the structure of weaving with the organic nature of handspun yarn makes for delightful cloth—a balance of opposites. But learning how to navigate that delicate balance can be a little overwhelming—and that’s why it is nice to have a bit of guidance. Will my handspun singles yarn be strong enough for a warp? What will the energy of the twist do to the hand of my cloth? Should I weave with cotton, silk, or wool? This eBook provides just the guidance you need to produce beautiful, functional pieces that will inspire you for decades to come.

Happy spinning,

Amy Clarke Moore, Editor

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Spinning for Beginning Weaving

BY JANE PATRICK, WITH STEPHANIE FLYNN-SOKOLOV,
MELISSA LUDDEN, GAIL MATTHEWS, AND BETH SMITH

I spin, but I am, heart and soul, a weaver. Weaving is how I orient my view of almost everything I do. The first handspun fabric I really, truly saw was the finest, sweetest, most masterful fabric spun and woven by Ella Baker. It was a humble cloth, simple plain weave (over, under, over, under), but exquisite. My memory of it is that it was indigo-dyed cotton in the finest handspun singles imaginable—beautiful soft shades of blue with slight variations in the yarn to create a fabric only possible with a yarn made by hand. I know that most spinners prefer to knit their yarn, but when handspun yarn is woven into fabric, it expresses itself in new ways. In weaving, lengths of yarn are interlaced and, therefore, are more exposed. In weaving, you see the length of yarn along warp or weft and can notice its slight variation. It is *beauty*. I'll never be Ella Baker, or even try, but to create a fabric that approaches hers is something I'd like to do in this lifetime.

Starter Scarf

Fiber: Main color: 2 oz wool/mohair dyed batt. Accent color: 2 strands of fine millspun 2-ply worsted yarn plied with a silver metallic thread.

Preparation: I separated the wool batt into strips.

Drafting method: Woolen.

Wheel: Schacht Ladybug.

Wheel system: Scotch tension.

Singles direction spun: Z.

Singles wraps per inch: 32.

Number of plies: 2, with a third yarn for creating seeds.

Plied direction spun: S.

Plied twists per inch: 5.

Plied wraps per inch: 16.

Total yardage: 306.

Yards per pound: 2,450.

Yarn classification: Fingering weight.

Yardage used: 230.

Loom: Rigid heddle.

Picks per inch: 10.

Sett: 10.

Finished size: 5½" × 74".

USING HANDSPUN FOR WARP

You've probably heard that you should never use a singles yarn in the warp.

This isn't necessarily true. You can use a singles, even a funky singles, but to

avoid disaster, I advise that you first test the yarn. To do this, place a length of yarn in the reed or the rigid heddle of your loom and rub it back and forth to test for abrasion. If it passes the rub



test, take a length of the yarn and pull on it firmly, simulating loom tension. If it readily pulls apart or snaps, best to use it for weft. If you know you are spinning a warp yarn from the beginning, then you can test your yarn right away. Also, pay attention to making good, strong joins as you spin.

Another weaving pointer when using handspun as warp is to advance the warp often to minimize abrasion. Also, in rigid-heddle weaving it helps to clear the shed behind the heddle after advancing the warp each time. To do this, place the heddle in the up position and run your hand in the space behind the heddle to the back of the loom, moving twisted warps to the back of the loom.

USING HANDSPUN FOR WEFT

Anything goes in the weft. You don't have to worry about abrasion or strength or how fat and fuzzy the yarn is. Using handspun in the weft is a great way to use dibby dabs you've spun over the years. Think of accents at



Gail Matthews's
Autumn Leaves Scarf.

Autumn Leaves Scarf

Weft: 4 oz Bluefaced Leicester roving from Shuttles, Spindles, and Skeins, Boulder, Colorado.

Warp: 180 yards 1 8/2 Jagerspun Zephyr (wool/silk blend).

Drafting method: Semiworsted.

Wheel: Schacht Matchless double treadle.

Wheel system: Scotch tension.

Singles direction spun: Z.

Singles wraps per inch: 13.

Yards per pound: 700.

Yarn classification: Bulky.

Loom: 4-shaft loom Baby Wolf.

Ends per inch: 12.

Picks: 12 in 2/2 twill.

Threading: Straight twill (threaded 1, 2, 3, 4).

Finished size: 8 1/2" x 70".

Basic weaving terms

A **loom** is the frame that holds the warp threads aligned and under tension so that weaving can take place. The **warp** is all of the threads that are aligned vertically on a loom before weaving begins. A **warp end** is a single warp thread. The **weft** is all of the horizontal threads that interlace with the vertically aligned warp. A **pick** is a single pass of the weft through a **shed** (the space that is created when select warps are lifted by the **heddles**); a pick is also called a shot. **Sett** is the number of warp ends per inch, something like gauge in knitting.

For more weaving terms, take a look at the list provided by *Handwoven* magazine at www.interweave.com/weave/projects_articles/Weaving-terms.pdf.

If you are a complete newbie to weaving, look for Liz Gipson's new book *Weaving Made Easy* (Interweave, 2008) to get you started in rigid-heddle weaving. And you can't go wrong with Deborah Chandler's *Learning to Weave* (Interweave, 1995).

the end of a table runner in handspun cotton or linen. Try lines of fuzzy mohair or novelties as accents in the weft.

STARTER SCARF

If you've never woven with handspun before, this scarf is an easy first project. It doesn't require much yarn, and the weaving is simple, too. I measured the yarn with the direct warping peg method directly from my spinning wheel bobbin (visit the Schacht website for detailed instructions, www.schachtspindle.com/instructions/weaving/flip-manual.htm). For added interest, I skipped a slot and hole in the reed on either side of each of my two-end accent stripes.

SPINNING

For the main warp and weft yarns, I Z-spun a wool mohair batt and then spun the singles S for a 2-ply yarn. The accent yarn is what I call cheater yarn—millspun yarn respun to create a new yarn. Every so often I created little seeds by holding the two singles yarns taut,

and then with my right hand, I loosely wrapped a 1/4-inch section with the third yarn, creating a little bump. The seeds add textural interest to the fabric, but I caution you to make sure they are small enough to slide through the slots and holes in the reed. Some of mine were a little large and needed to be coaxed through with my threading hook when I came upon them.

WEAVING

Thread a 10-dent rigid-heddle reed 6 inches wide with a warp $2\frac{1}{2}$ yards long. I threaded an inch of two-ply, then skipped a slot and hole, then threaded two ends of novelty, skipped a slot and hole, then threaded another inch of two-ply, and so on. The skipped dents give the novelty yarn a little breathing room, create textural interest, and help with the drape of the scarf.

FINISHING

I handwashed the scarf in hot, soapy water with a lot of agitation. I wrung it out in a towel and then steam-pressed

Cloud Yarn Scarf

Warp: 20/2 millspun silk yarn.

Weft: 8 oz hand-dyed kid mohair locks plied with 30/2 millspun silk.

Preparation: Carded cloud.

Drafting method: Some short backward draw with long draw to keep the yarn lofty.

Wheel system: Scotch tension.

Ratio (singles/plying): 6:1 (both).

Singles direction spun: Z.

Number of plies: 2.

Plied direction spun: S.

Plied twists per inch: 3.5.

Plied wraps per inch: 6.

Total yardage: 75.

Yards per pound: 250.

Yarn classification: Bulky.

Picks per inch: 4–5.

Loom: Rigid-heddle loom.

Ends per inch: 10.

Finished size: 7" × 72".

with a press cloth and a lot of pressure. The ends were finished with a twisted fringe.

Because I'm primarily a weaver, I teamed up with more experienced spinners to explore handspun yarns in some beginning weaving projects. Here I share their ideas and samples to illustrate ways to think about using your handspun stash to weave.

AUTUMN LEAVES SCARF

Gail Matthews wove this warm, soft, and drapery scarf on a four-shaft loom. By using a warp yarn that blends with the weft, she allowed the beautiful color gradation of her handspun to be the focus.

For weft, Gail used a commercially prepared Bluefaced Leicester roving purchased from her local shop, Shuttles, Spindles, and Skeins. She stuffed the roving in her dyepot and sprinkled in brown, orange, yellow, blue, and red acid dyes. She did not stir.

FINISHING

Gail handwashed her fabric in warm water and laid it flat to dry, lightly steam-pressing. She finished the ends

with a knotted and twisted fringe.

CLOUD YARN SCARF

Quite another look is achieved by **Beth Smith**, owner of The Spinning Loft in Howell, Michigan. Beth used a 20/2 commercial silk yarn and threaded (sleyed) it in a 10-dent reed on her rigid-heddle loom. For weft, she spun custom-dyed kid mohair directly from the locks for a yarn that is light and fluffy and luscious. "I spun it just as it came from the locks. I let it do its own thing," explains Beth.

After spinning a thick-and-thin singles, Beth plied with a fine, 30/2 commercially spun silk.

Because this yarn is so puffy and soft, it would prove difficult as warp; therefore, Beth used this yarn in the weft. She blended both yarns along the length of her scarf, letting yarn loops poke out willy-nilly. Though the weft is bulky because it is softly spun and woven, the scarf has a lovely drape and rich texture.

IN THE GARDEN BORDER

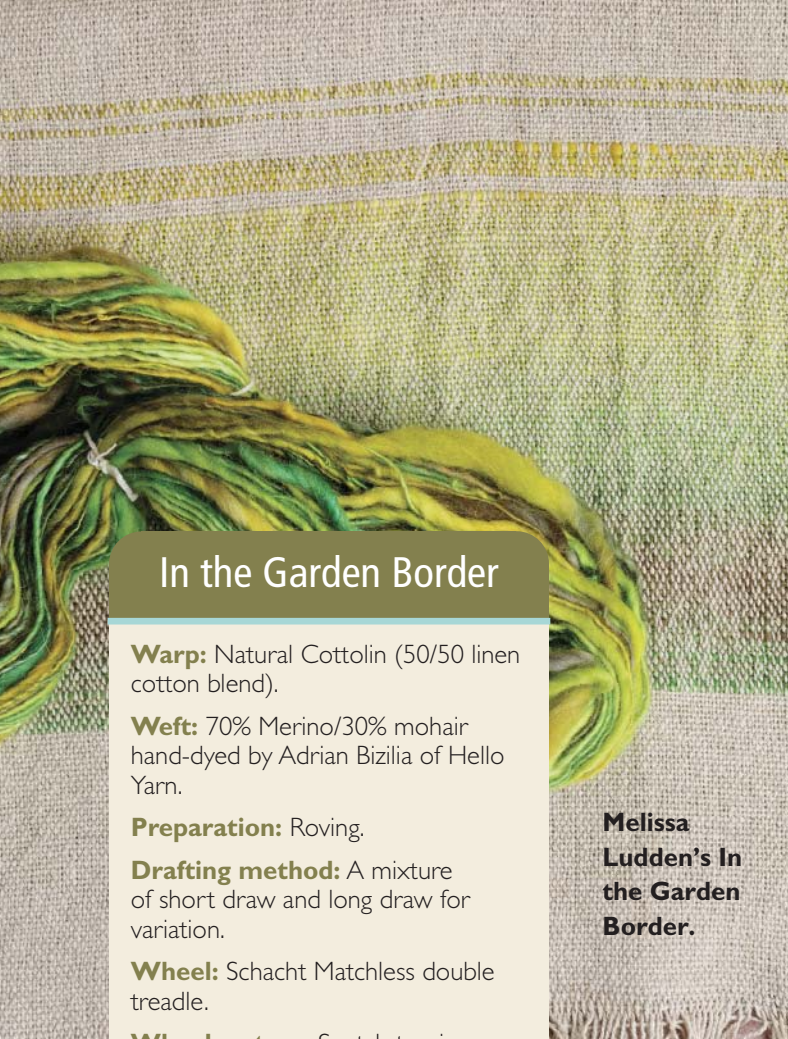
For this fabric that will be made into a skirt, **Melissa Ludden** used handspun for an accent border. Her yarn was spun from 70% Merino/30% mohair roving hand-dyed by Adrian Bizilia of Hello Yarn. Melissa says that she mostly spun worsted but would sometimes spin woolen to give her yarn a little more character. She tried for thick-and-thin yarn, as she thought some variation in the yarn would be interesting when woven.

To prepare her fiber, she separated the roving in color sections, aiming for fairly consistent color changes. To keep her colors clear and unblended, she didn't ply the yarn. She transferred the yarn directly from the spinning wheel bobbin to her shuttle bobbin with no finishing or washing in between.

For her warp, Melissa used natural Cottolin. When it came time to weave the border, Melissa gradually blended in her handspun, weaving a few picks of her wool singles, then a few picks of Cottolin in no particular pattern for about 2 inches before beginning



Beth Smith's Cloud Yarn Scarf.



In the Garden Border

Warp: Natural Cottolin (50/50 linen cotton blend).

Weft: 70% Merino/30% mohair hand-dyed by Adrian Bizilia of Hello Yarn.

Preparation: Roving.

Drafting method: A mixture of short draw and long draw for variation.

Wheel: Schacht Matchless double treadle.

Wheel system: Scotch tension.

Ratio: 9:1.

Singles direction spun: Z.

Singles wraps per inch: 11.

Total yardage: 450.

Yards per pound: 1,800.

Yarn classification: Sportweight.

Loom: Schacht Baby Wolf.

Sett: 20 ends per inch, 17" wide.

Threading: Plain weave.

Finished size: 15" x 25".

Melissa Ludden's In the Garden Border.

the solid wool border. The resulting border is a muted blending of colors, a soft, grassy woven landscape. Look for Melissa's fabric sewn up into a stunning skirt in *Weavezine* (www.weavezine.com/content.woven-skirt-handspun-twist).

SOFT BREEZES SCARF

Stephanie Flynn-Sokolov used two handspun yarns to create this simple scarf on a rigid heddle loom. The back-

Stephanie Flynn-Sokolov's Soft Breezes Scarf.



Soft Breezes Scarf

Warp: 80% wool/10% silk/10% cashmere hand-dyed and prepared batt from Abby's Yarns, Z-twist, 22 wpi.

Accent Warp: (1) 100% yellow tussah silk singles, Z-twist, 17 wpi; (2) pale pink tussah silk with blue-gray noils, Z-twist; (3) pink bombyx silk singles, Z-twist, 21 wpi.

Weft: Classic Silk (50% cotton/30% silk/20% nylon) in pale green.

Wheel: Schacht Matchless double-treadle.

Wheel system: Scotch tension.

Loom: Rigid heddle, 10-dent reed.

Finished size: 4½" x 36".

ground warp was spun from a dyed and prepared batt of wool/silk/cashmere. Her accent stripes are a novelty yarn created from three singles: a 100% yellow tussah silk singles, a pale pink tussah silk with blue-gray noils spun in by separating during drafting and inserting the noils, and a pink bombyx silk singles. Stephanie plied the yellow silk and the tussah silk noil yarns together. In a second step, she plied this yarn with the bombyx, knotting it back and forth over the noils.

She designed the weave to show off her novelty yarn by picking up those threads to create warp floats, resulting in weft floats on the reverse side which are also appealing (the reverse is also shown). To balance the weave and color, Stephanie chose a millspun yarn, Classic Silk, in pale green for the weft.

JANE PATRICK is creative director for Schacht Spindle Co. Inc., a former editor of *Handwoven*, and author of *Time to Weave: Simply Elegant Projects to Weave in Almost No Time* (Interweave, 2006). She keeps company in the office with fellow spinners, weavers, knitters (and bicyclists!) Stephanie Flynn-Sokolov, Melissa Ludden, and Gail Matthews. Beth Smith is a spinner and owner of The Spinning Loft in Howell, Michigan.

A Scarf for the Rigid Heddle Loom

Rediscovering a useful tool

BY LIZ GIPSON

I have always believed that a person's weaknesses can also be their strengths. This dictum is true, too, for the rigid heddle loom. Weavers frequently dismiss this loom as a useful tool because it has a limited sett range, does not provide a strong beat, and has only two sheds. But it may be the perfect handloom for spinners. The rigid heddle is gentle on yarns because it has a plastic heddle/reed, produces very little loom waste, is easy to warp, and is extremely portable.

Since spinners control the size yarn spun for a project, a limited sett range doesn't have to be a problem. Spinners can create yarns that take advantage of this loom's special characteristics to produce unique and inspiring cloth. For instance, the rigid heddle loom is great for using active-twist yarns to create crepe fabrics because the wide sett and soft beat¹ give the active yarns plenty of room to move.

SPINNING THE YARN

I used Ashland Bay's Merino/tencel blend (peacock) for the warp and weft of this scarf. The tencel provides a sheen and strength similar to silk, the long staple length allows for a smooth yarn, and the Merino contributes a supple hand.

Project Notes

Finished size: 6" x 50" with 7" fringe.

Fiber: 4 ounces of Peacock Tencel/Merino blend from Ashland Bay.

Warp yarn: 2-ply yarn that measures 3,000 yards per pound (2 ounces).

Weft yarn: Singles yarn that measures 6,000 yards per pound (1 1/2 ounces).

Sett: 10 ends per inch (80 ends total, 80" warp on warping board).

Weave structure: Plain weave.

¹ Given the way a rigid heddle loom is constructed, you can't pack in the weft the way you can with a traditional beater bar, but you can create a firm cloth if you beat the fell line a few times with the heddle/beater bar.



Liz used the short-draw technique to spin an active twist-singles for her scarf.



The rigid heddle loom has been an underutilized tool by many weavers because of its limitations—but sometimes those same limitations can be an asset. Liz Gipson thinks that the rigid heddle loom is the perfect loom for spinners.

Taking advantage of the soft beat of the rigid heddle loom, I left a sixteenth-inch gap between warp and weft to create enough room for the active-twist yarn to bloom once the scarf was off the loom. In order to create the warp spacing I chose a 10-dent rigid heddle and spun fine singles that measured 6,000 yards per pound using the short-draw method. Although I was not very concerned about loft, I tried not to mash the yarn too much while spinning. To do so is a challenge with the short-draw method, but I wanted the well-spun, fine, sturdy yarn that short draw produces. I plied the singles to create a two-ply yarn that measured 3,000 yards per pound. The yarn appears much larger in the fringe than in the skein because I didn't wash the yarn before weaving to keep the bloom in the web of the woven fabric.

I spun an active-twist singles yarn that measured 6,000 yards per pound for the weft—half the diameter of the warp to create a raised warp surface in



To create the crepe effects in her scarf, Liz spun a balanced 2-ply yarn for the warp and a singles yarn for the weft using a Merino/tencel blend from Ashland Bay.

a full 2 inches off the woven width. I allowed only 15 inches for loom waste and shrinkage because I used the yarn tied to the apron rods as fringe. I tied a choke about 20 inches from the cross

Since spinners control the size yarn spun for a project, a limited sett range doesn't have to be a problem.

the fabric. I found that it is important to have consistent twist in the yarn, and I experimented until I got the result I liked: a singles S-twist yarn with a 30-degree twist angle.

I knew my fabric would be a little distorted because the singles weft yarn would not be balanced with a singles Z-twist warp. But the plied warp and the woven grid balances the energy enough so that the fabric does not slant. If you wove this scarf with a singles Z-twist warp you would create a much lacier fabric.

WARPING

I wound an 80-inch-long warp with 80 ends because the twist in the yarn takes

to keep the yarns from being pulled unevenly during the threading process.

Conveniently, the rigid heddle comes with its own reed stand. I marked every inch of the rigid heddle with a permanent marker so that it was easy to find the right-hand edge of the weaving width, and I placed the rigid heddle in the resting slot. To thread the loom I used the same method that Deborah Chandler describes in her book *Learning to Weave* (Interweave Press, 1995).

For the rigid heddle loom, I like to wind on the warp by slightly tensioning the warp with my left hand while winding on with my right hand. (I

don't use this method on my floor loom because I have to reach too far, an action that throws off my tension.) I slip paper or sticks between the layers of warp threads while I wind onto the back beam. I stop every other rotation to pull the warp from the front to make sure the yarn is snug on the back beam.

WEAVING

I like to use a stick shuttle about three inches wider than the warp. After weaving in scrap yarn to spread the warp evenly, I place the weft at about a 45-degree angle in the shed before beating. In order to get the effects I want, I find that it is important to be consistent with my weft angle and with how hard I beat the cloth.

FINISHING

I hemstitched both ends on the loom under tension. Hemstitching is my favorite finishing technique, but I am often so eager to start weaving that I skip this step at the beginning and then regret it later when I have to choose another technique.

I washed the scarf in warm water with mild detergent and agitated it slightly. I was glad I had been consistent when I spun my singles, and took care when I placed the angle because it was fun to watch the scarf bloom right before my eyes.

LIZ GIPSON spins and weaves in Fort Collins, Colorado. She has seven rigid heddle looms.

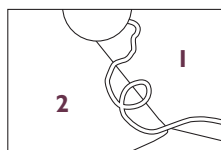
Resources

- Davenport, Betty. *Hands-On Rigid Heddle Weaving*. Loveland, Colorado: Interweave Press, 1987.
- Hart, Rowena. *The Ashford Book of Rigid Heddle Weaving*. Ashburton, New Zealand: Ashford, 2002.



Singles warp? Yes, you can.

BY LINDA LIGON



1. When Linda spun this jacket fabric from space-dyed top, she wanted to keep the colors distinct—so she didn't ply the warp yarn.

2. Even picked wool from a breed with short fibers can make a good warp, like in this blanket Linda made together with her son.

The craft of spinning is laden with old wives' tales. Its roots are in the earliest history of humankind, so we've had centuries to create an extensive mythology around our craft.

Here are just two of the old wives' tales that have been making the rounds since I started spinning almost forty years ago:

- Handspun yarn is not suitable for a warp—use it for weft only.
- If you *do* try to weave with a handspun warp, it must be plied.

It's pretty easy to dismiss the first of these. Just go to any museum that has textiles predating the Industrial Revolution, and you'll see that they're all handspun, every last bit of them, warp and weft both. So why have so many of us modern weavers, with our wonderful wheels and looms, bought into the myth that we can't use our handspun for warp? Probably for a couple of reasons.

First, our looms. Jack, or rising shed, looms,

really are harder on warps than the more traditional counterbalance or countermarch ones. Every warp thread is required to stretch a considerable distance, over and over again, to create a workable shed. Rigid-heddle looms present even more of a challenge: the “hole” threads rise and sink again and again, while the ones in “slots” remain in a neutral position.

Second, the way we spin (or spun). When spinning was experiencing its umpteenth renaissance in the 1960s and 1970s, most spinners were working with wool, often uncarded or even unwashed, and they were producing soft, uneven yarns—yarns with slubs that could easily drift apart or become seriously abraded by heddles and beaters. It's quite true that *these* yarns were not suitable for warps!

WHAT ABOUT SINGLES?

So let's set aside the notion that we can't spin our warps. Of course, we can. We simply need



to spin yarns that have enough twist not to drift apart, enough stretch to make a good shed without self-destructing, and enough consistency not to get hung up in the loom apparatus. (Add to that enough smoothness not to get tangled with adjacent warp threads—but more about that later.)

But what about singles? Are they inherently too fragile to withstand the wear and tear? Well, it depends (like most things in our subtle craft). Look at old linen or silk damask fabrics from days of yore. More often than not, they are singles in both warp and weft whether they are really old (woven on handlooms) or newer (woven on industrial looms, which are not exactly gentle on the warp threads). Of course, both flax and reeled silk have very long fibers. If they have been spun with sufficient twist, and perhaps have appropriate sizing (more about that later), they are pretty indestructible.

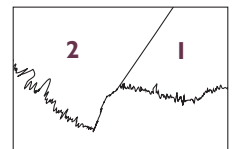
A singles wool warp presents more challenges. A longwool, spun worsted with a fair bit of twist, should present no problems. What about a shorter fiber, softly spun—is it possible? It is. Look at the fuzzy plaid fabric on page 8. When I spun this jacket fabric from space-dyed top, I was aiming to keep the colors distinct. Plying would have muddied them unless I had Navajo-plied, which my hands don't do so well. I also wanted a fuzzy, slightly full fabric, so I split the top into thirds and spun it in a sort of hybrid woolen-worsted

method that resulted in a soft yarn without a lot of twist—about 8 twists per inch on average. As you can see, it made cloth, and warp breakage was almost nonexistent.

But that was top. What about picked wool? Many years ago, my then-young son raised some Corriedale sheep, and we had a little family project of turning one of his fleeces into a blanket. We had the fiber commercially washed and picked (not carded). I spun the yarn from the resulting mass of fuzz, and he (age eleven) wove it. Both warp and weft were singles. More than twenty years later, the blanket abides. The keys to success were warp sizing (see sidebar on page 10), choice of weave structure (broken twill), and a wide reed. These latter choices meant minimal abrasion of the warp threads against their neighbors.

COTTON? ARE YOU KIDDING?

It would never have occurred to me that you could make a decent cotton singles warp until I started to closely examine the old pillowcase above. I picked this up in a junk shop years ago. Here's what's embroidered on it: 1820/spun by Mrs. J. Albertson in 1865/1905. I don't know quite what all those dates mean, except that it is handspun, and it is old. Most amazingly, it appears to be cotton, and both warp and weft are singles. The fibers are short and very fine. I imagine a great wheel.



1. Linda found this old cotton pillowcase at a junk shop years ago—it inspired her to weave with singles warp and weft.

2. Linda's little scarf is made with handspun cotton blended with silk.

A simple milk sizing

This recipe is excerpted from Alden Amos's *Big Book of Handspinning* (Interweave, 2001), which also includes recipes based on boiled flour and gelatin.

1 packet instant nonfat dried milk (enough to make a quart of milk)
2 cups cool water

Stir powdered milk into water until well mixed. Dip warp chain into it, gently squeeze out excess sizing, and hang to dry before using. This is a runny sizing that is somewhat slow to dry. It also can develop a "sour milk" odor over time if the climate is humid. It washes out of the finished fabric easily.

The little scarf, on the other hand, is spun from a blend of cotton and very short tussah silk. There's a lot of twist in the yarn, and the tussah, short though the fibers are, tends to "grab" the cotton, making for a very sturdy little singles that posed no problems in the warp.

WHY USE A SINGLES WARP? AND WHAT ARE THE TRICKS?

According to Judith MacKenzie, you should have a very good reason for using a singles warp, saving time not being one of them. For my projects, I liked the way an all-singles wool fabric fullled, though I confess I didn't sample with a plied warp. I liked the way the cotton/silk, highly twisted, resulted in a crepey fabric. The old pillow-



Rigid heddle looms put stress on every other warp because the warp threaded through the hole rises and sinks, while the warp threaded through the slot remains in a neutral position.

case? Who knows? Maybe Mrs. Albertson couldn't spin a thin enough yarn to ply it and still have a fairly fine, supple fabric. (Or maybe she was in a hurry.)

As for making it work, here's what I've learned from my limited experience:

- Put enough twist in your fiber and try to spin a fairly consistent yarn. You don't need to overdo this, but just be sure you don't have soft spots that will drift apart.
- Test the strength of your warp. Don't judge your yarn by tugging on a single thread—tug on a whole bundle, maybe a dozen or twenty threads. A whole warp is stronger than any single element.
- If you're weaving with wool and you want your fabric to full nicely, don't wash or block your warp before weaving it.
- If your warp is at all fuzzy, put a warp sizing on it so the threads won't tangle with their neighbors. There are a number of glue-based products on the market for this purpose, but the milk sizing recipe at left has been perfectly adequate for my needs, and it's always right there in my pantry.
- Dress your loom gently. I like to warp from back to front so the warp threads don't have to go through the reed and heddles but once. I use a raddle, but once I've tied onto the back beam, I remove the back lease sticks to eliminate drag. I also keep my warps fairly short—no more than 6 or 8 yards at most.
- Take it easy. Be sure your shed is clear before throwing the shuttle; don't let your selvages draw in too much. Have enough extra warp thread to make repairs if you need to. That's it.

LINDA LIGON is the founder of Interweave and creative director of *Spin-Off* magazine.



Rising shed looms are harder on warps than counterbalance looms because they stretch the warps a considerable distance to create a shed.

Weaving with Singles

BY HOLLY SHALTZ



Holly spun her first handspun project using a handcarded blend of 50% white Merino wool, 25% white angora, 25% white cashgora blend. She dressed the loom with the two-ply yarn using a plain weave structure sett at 10 ends per inch. The finished scarf measured 65½ by 68 inches.

One spinner's journey

I began my journey of weaving with handspun when I discovered that I was spinning more yarn than I could ever knit. I tried weaving with my handspun and found that conventional wisdom was correct—weaving uses yarn much faster than knitting. Spinning for weaving was also a great way to improve my spinning skills.

I learned a lot of lessons about weaving with handspun yarns. I've collected some of those lessons here, pretty much in the order I learned them, with the hope that they will inspire other spinners to begin their own journeys using their handspun in weaving projects. Some of these lessons are pretty basic and may make you laugh to think anyone could have made such silly mistakes. That's okay—I laugh at them today, too!

Lesson 1: If your spinning isn't very consistent from the beginning of a bobbin to the end, or from one skein to another, and you don't want that to be obvious in your finished piece, wind your warp using all your balls of warp yarn at one time.

Place the balls beside your warping mill or board. Hold all the ends together, and wind them on the mill or board at one time. This will distribute the differences in texture across your warp quite evenly, making it look planned rather than accidental. And because this is a faster way of measuring the warp than winding with only one strand of yarn at a time, it'll speed up your time at the warping mill.



Holly made this shawl by blending wool from a white Romney fleece and black Border Leicester fleece. She warped the two-ply yarn at 12 ends per inch. The weaving was done as a public demonstration on a portable four-shaft loom. The shawl is 18 inches by 90 inches, excluding the fringe.

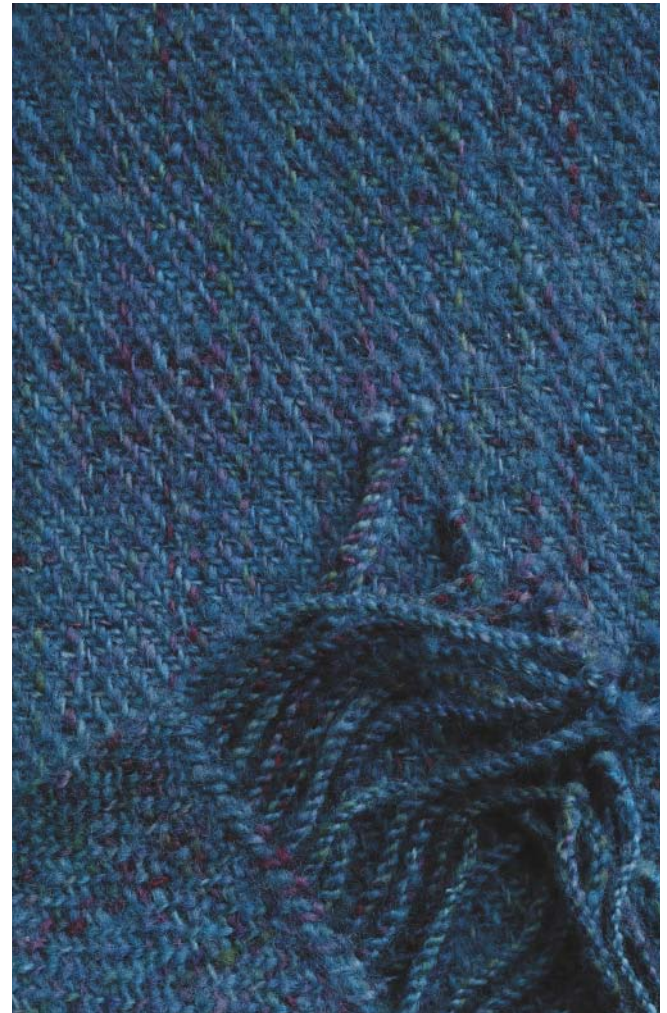
I'm a little more technically oriented today, but back when I spun the yarn for my first all-handspun project, I was very much a seat-of-the-pants kind of spinner. I didn't have a clue how to measure the thickness of my yarn. This scarf was my very first all-handspun, handwoven project and used all plied yarns.

One skein of yarn was noticeably thicker than the rest. And, of course, that one skein ended up mostly along one edge of the scarf! Today I wind my warp from all my balls of handspun at one time, sometimes up to about ten balls at once. I haven't had any problems doing this, or then dressing the loom. I have used this method with setts up to 18 ends per inch.

Lesson 2: Plied warps are no guarantee there won't be breaks.

A number of years ago, my guild asked me to spin the warp and weft for a shawl that would be woven as part of a demonstration at a local festival. Local shepherds with small handspinner flocks donated a white Romney fleece and a natural black Border Leicester fleece for the project. I chose to use the white for the warp and spun a sturdy two-ply yarn. I blended the white and black on a drumcarder to create a weft yarn that gradated from white to black through ten shades of gray.

Another guild member donated the use of her four-shaft portable floor loom and she dressed the loom. I was



Holly's first project using all singles yarn was a winner in the 1990 Interweave Press Sensational Scarves contest.

asked to weave the project during the demonstration, but I declined because I still had very little weaving experience. The guild member who wove in my place was a production rug weaver. She beat that warp as if it was a rug and many ends broke. After the demo, the owner of the loom finished off the shawl with no further broken ends, and it remains an interesting teaching piece, to say the least.

Lesson 3: Singles warps don't necessarily break.

I planned a woven winter jacket, using space-dyed handspun singles yarns from a Border Leicester/Corriedale cross fleece. I counted my treadles while I spun, deliberately putting quite

Using the long draw drafting technique, Holly spun a singles wool and a singles mixture of luxury fiber blends of camel down, tussah and bombyx silks, mohair, and Merino to ply for the warp of her Winter White Shawl.



a bit of twist into the yarn because I wasn't sure how much twist would be needed to keep the singles warp from breaking. I found that spinning all that plain white yarn got real old, real fast. So rather than spin enough white yarn for a jacket, I decided to make a scarf to match my existing coat with the eleven skeins I had already spun. I space-dyed the yarn, dressed the loom, and wove the scarf. Much to my surprise, I had no breaks in the warp!

As many others have advised, be careful when you join a new fiber supply on to the end of the yarn you've spun. I make sure a full staple length of fiber is left unspun at the end of the yarn, and I fan that area out a bit. I lay the new supply over the fan and fold

the edges of the fan over it. I draft a little, if needed, to make sure that the yarn is the same thickness at the join as it is elsewhere. Then I put a bit more twist into that section of yarn, smoothing the ends into the yarn using a worsted draft.¹ I find this technique works well in preventing breaks where the new fiber is joined.

Lesson 4: Singles yarns are faster to spin than plied yarns.

I enjoy spinning and I enjoy being productive. Like everyone else, I'm a busy person and my time is worth a lot to me. So when I find a technique that works well, saves time, and is just as enjoyable as slower methods, I'm all for it. Using singles for warp and weft yarns is a valuable time-saver. Singles yarns are no more difficult to spin than plied yarns, can perform just as well as plied yarns, and offer design opportunities that plied yarns can't match.

Lesson 5: Sometimes plying your warp yarn is a good idea for structural reasons.

¹ Worsted draft means using a short draw drafting technique while controlling the twist so that the twist enters the yarn as you smooth the fibers into the twist.

Like every other beginning spinner, I had experimented with small quantities of luxury fiber blends. Camel down/tussah silk, bombyx silk/Merino wool, mohair/wool blends, et cetera. These fibers yielded lots of lovely, soft, natural colors and textures. After letting them sit in the basket for a couple years, I decided to use them in a weaving project. However, I knew they wouldn't hold up alone as a singles warp because I had given these soft fibers a soft twist. And there wasn't enough yarn to do much with if I plied them with themselves. So I dipped back into that Border Leicester/Corriedale cross fleece and spun a singles yarn to ply with the luxury yarn for my warp. I used the same wool singles for the weft and made a heavy but wonderfully soft and subtle shawl that I call my Winter White Shawl.

Lesson 6: Less twist makes a softer singles yarn that can still make good warp.

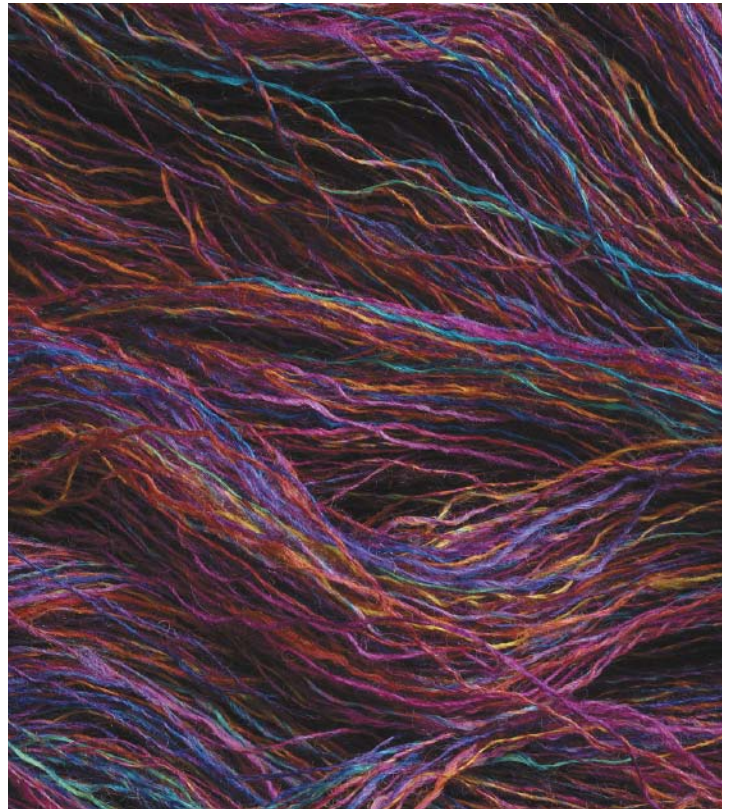
After spending a lot of time treadling for the coat that became a scarf, I decided to try for less twist in future warp and weft singles yarns. I wanted to figure out how much twist was just enough twist. With a lot of trial and error (including a few projects I cut off the loom because too many warp ends

The tug test

- ▶ Spin some yarn with whatever amount of twist you feel is appropriate.
- ▶ Pull about a yard of yarn off the bobbin through the orifice (there is no need to break it off).
- ▶ Holding both ends of the length of yarn, give it a long, steady, firm pull. The idea is to mimic the tension the yarn will be under when it's on the loom.
- ▶ If the yarn just drifts apart, add a bit more twist and test again. If the yarn snaps, try a little less twist.
- ▶ If the yarn holds, then it should be strong enough for warp yarn. However, if your goal is to make a cloth with a soft hand, try releasing a little twist and testing again. Or, if you're making a cloth that will receive a lot of wear and tear, you may need a little extra twist.
- ▶ If you're using the long draw method, you can do the tug test as you spin. Just before allowing your length of yarn to wind onto the bobbin, apply the tug test very quickly. You will instantly know whether you need to add a bit more twist to that length of yarn before it winds on.



Holly dyed raw Corriedale wool with Ciba Kition dyes, then washed, precarded, and drumcarded the wool into layered batts to spin the singles yarn to weave a scarf for her mother.



Using a Border Leicester wool with a touch of yearling mohair, this warp was dyed in the wool with Ciba Kition dyes. Holly precarded the locks and then carded separately by color on her Mark V drumcarder. In the final carding, she layered the batts in groups of related colors. The warp has been sized with gelatin in preparation for weaving.

broke), I developed a simple technique I call the “tug test” to check warp singles for strength while I’m spinning them.

My twist angle is typically right around 15 degrees when I’m using wool or primarily-wool blends with a staple length of about 5 inches. I use this amount of twist for softly spun singles, in the warp and weft, for garments that need a soft hand. I find they wear well, at least up to a point. I would probably choose more twist for a barn jacket, but the shawl my daughter wore daily last winter did just fine with a 15-degree angle of twist.

However, I find that fine fibers with a lot of crimp, such as Merino and Corriedale tend to full more than I like when the yarn is spun softly. I made two or three Corriedale scarves before I decided it wasn’t suitable for the type of drape I wanted in my projects. No mat-

ter how gently I washed the scarves, the fiber fulling tremendously and draped as well as cardboard.

Lesson 7: Sizing helps prevent yarns from shredding in the warp.

Using a soft twist singles for warp may seem scary to some spinners. Sizing—a liquid substance applied to

the warp—temporarily glues the fibers together within the yarn. While it’s not a substitute for a carefully spun yarn, it does help prevent the kind of breakage caused by neighboring yarns rubbing against each other as the sheds change. The recipe I use comes from an article in *Handwoven* by Stephenie Gaustad—“A Question of Size” (November/December 1989, page 55). It uses plain unflavored gelatin. I have also tried flour paste sizing, but it didn’t wash out well, and dry milk sizing, but found it ineffective compared to the gelatin sizing.

I like to size my warp yarns as skeins. The strands of yarn stick together from the sizing. Winding the sized warp into centerpull balls before winding the warp on a mill or board gives you an opportunity to separate the strands.

Stephenie Gaustad’s Sizing Recipe for Warp Yarns

1. Soak 2 packets ($\frac{1}{4}$ ounce) plain, unflavored gelatin, in $\frac{1}{4}$ cup cold water.
2. Add 1 cup boiling water and stir until gelatin is thoroughly dissolved.
3. Add $\frac{3}{4}$ cup cold water, and the sizing is ready to use.

Don't pre-wet the skeins before sizing. The gelatin mixture needs to permeate the yarn. If the yarn is wet, not enough gelatin will penetrate to do any good as sizing.

Place the first skein in the container with the sizing. The sizing will soak in quickly. Remove the skein, squeeze out the excess sizing back into the container, and set the freshly sized skein aside. Repeat this process for each skein. When you've soaked all the skeins once, repeat the process one more time to make sure all the yarn is thoroughly saturated with sizing.

Do not use your washing machine to spin out excess sizing because too much of it will spin out and what is left won't be effective.

Hang the skeins to dry where they can drip freely. I use the shower stall in the winter, and I make sure to rinse the floor of the stall after removing the dry skeins because the sizing makes the floor very slick. About ten minutes after hanging up the yarn, I squeeze out the excess sizing from the bottoms of the skeins and rearrange them so the wettest parts are near the top.

After another thirty minutes or so (sooner if you're drying outside on a warm, breezy day), I begin to pull apart the strands of yarn. This action opens the skeins and helps them dry faster, especially if they are drying indoors. Pulling apart the strands also makes it easier to wind the yarn into a ball.

Wait until the yarn is completely dry (which can be between 3 and 48 hours depending on the conditions and climate) to wind the skeins into centerpull balls or the damp areas will stick together inside the ball and it will be difficult to wind the warp. When the yarn is dry, I wind the skeins into centerpull

balls and then wind my warp. After weaving, I finish the cloth and remove the sizing by soaking the yardage in hot water in a washing machine for about 10 minutes. Your cloth will full a little just from soaking in the hot water. If you want to thoroughly relax the fibers, agitate the cloth briefly and gently. Fine wools will full quite a bit with just a soaking, while medium and long wools can take some agitation without turning into balls of felt. Shrinkage will vary considerably, depending on the fiber, weave structure, amount of twist, and other factors. Your best bet is to remove the cloth from the water frequently to check the fulling until it looks right to you, then spin it out



Starting with a Border Leicester/Corriedale fleece and a bit of mohair, Holly dyed the raw wool with shades of green along with yellow, blue, and rust. She precarded the locks and carded the colors separately on her drumcarder, adding a little mohair as she carded. She then carded the layered batts together and divided the batt into long strips for spinning. Using a 2/2 twill at 12 ends per inch, Holly wove the fabric for the vest following a pattern from the November/December 1990 issue of *Handwoven* page 65.

without further agitation. I allow the washer to agitate the yardage if I want to full the cloth more thoroughly. Then I use the spin cycle to squeeze out the excess water. I usually use a little liquid dishwashing detergent to make sure the last bit of dye, grease, and general dirt wash out of the finished cloth. I then give the cloth a warm-water rinse and spin it out again. I usually place the cloth in the dryer for 5 to 10 minutes on low heat to remove wrinkles, then take it out of the dryer and lay it flat on my bed to finish drying. It rarely takes more than an hour to become almost completely dry.

Store your extra sizing in the refrigerator to use another time, but make sure it's labeled, because it will look just like fruit flavored gelatin if your fiber had any excess dye in it! When you want to reuse it, just reheat it in the microwave or in a saucepan until it becomes liquid again but isn't hot.

Lesson 8: Plyed selvages help prevent breaks due to draw-in.

Whether you're working with commercial or handspun warps, breaks are most likely to occur at the selvages where draw-in puts the warp under the most stress. Somewhere along my journey, a lightbulb lit up and I decided to try plying enough yarn for just the four ends on each side of the selvage. I seldom have a break there any more, except when I'm not careful to put enough twist into the singles before I ply the yarn. I find that the selvage singles need more twist than the rest of the warp singles since plying removes some of their twist.

I usually use the same type of fiber for making the plyed selvage yarns as I used for the rest of the warp. I spin the selvage singles thinner than the rest of the warp, so that when



Dyeing the Border Leicester wool and adult mohair wool with six colors of Ciba Kition dyes, Holly carded the wool so that it was shaded from green to purple. She spun the warp so that each bobbin had a stretch of yellow green, blue green, blue, indigo, blue purple, and reddish purple. Holly then spun a full bobbin of each color for the weft. The finished shawl is 26 inches by 75 inches, excluding fringe.



Holly precarded and carded colors for this shawl into heathered magenta, purple, blue, and green for the warp. She used a silvery gray with a natural gray Border Leicester fleece and mohair for the weft. Holly warped the loom using a 3/1 two-block twill with random widths in threading and treadling, and sett at 18 ends per inch.

it's plied the finished plied yarn is about the same thickness as the warp singles. My plied selvedge yarns are completely unobtrusive in the finished cloth.

When I later acquired books describing textiles from the Middle Ages and earlier that had been excavated in Great Britain, I was surprised and excited to learn that using plied selvedge yarns with a singles warp was quite common back then.

Lesson 9: Singles yarns offer some unique design possibilities.

About this time, I began playing with color in my handspun—carding batts with layers of different colors to spin into randomly colored yarns. This vest is my first project where the yarn was really designed from scratch for that specific project. I planned the color scheme, chose fiber I knew would perform well, and used a drumcarder to make layered batts

to spin. To spin from the batts, I tore lengthwise strips from the batt, about 8 per ½-ounce batt, predrafted them slightly, and spun long draw from the end. I chose to slightly mute the warp with a well-blended heathered weft singles, made from all the colors used in the warp.

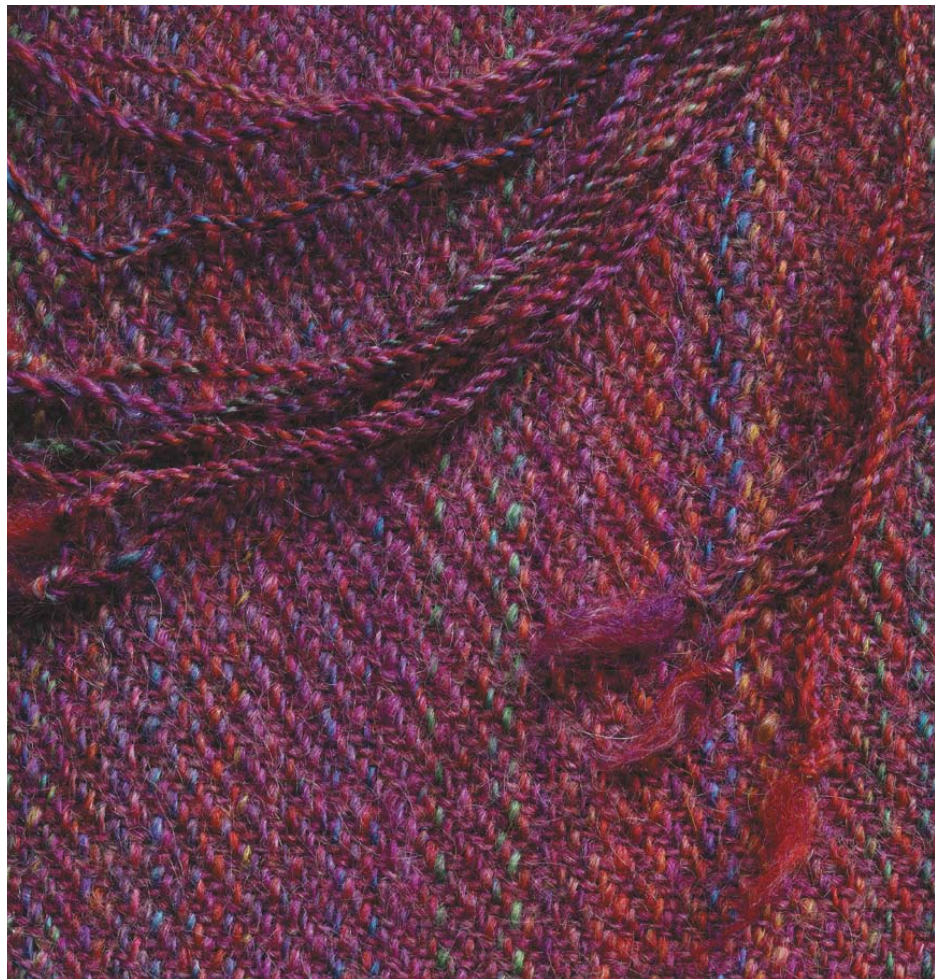
Lesson 10: Handspun in general offers design control that is unavailable with commercial yarns.

As spinners, we can control every aspect of our yarn from start to finish. Weavers, as well as knitters, can take advantage of this feature by using handspun. Just as I choose the fiber combinations, colors, and spinning method to create sock yarn that won't wear out easily, so, too, can I design yarns for weaving that are ideal for the finished project.

This shawl is an example of a yarn spun for a very specific design idea. I carded many colors of wool to achieve two shades each of green, blue, and purple. After estimating how much yarn I needed for the warp and weft, and how much yarn I usually produce when I fill a bobbin, I spun six balls of yarn for the warp. Each ball shaded from purple to green. I was able to warp with them all at one time (see **Lesson 1**) yet have a subtle change of color from one edge to the other in the warp. The fact that each bobbin's color changes occurred at slightly different places blends the edges of those changes in the warp in a way that I find very appealing.

Lesson 11: Weave structures can be plain or fancy.

I stuck to plain 2/2 twill for most of my first projects. I felt that the colors and textures of the handspun should be the star attraction and that the weave



To make Magenta Madness, Holly used her drumcarder to prepare heathered batts. She challenged herself to work with a less-than-favorite color and ended up with one of her favorite pieces.

structure should provide good drape but not steal the show. Since then I've experimented with a few two-block twills on my eight-shaft loom. I like the effect these twills create and will keep experimenting with them in the future. The only caveat I can offer at this point is to consider the length of floats when you're using handspun singles. When you're using a softly spun singles yarn, floats that are likely to snag may also be likely to break.

Lesson 12: Weaving with handspun is an incredibly satisfying and exciting journey.

If you haven't yet seen your own handspun warp stretched out on

the loom, and sat down with your handspun weft in the shuttle, ready to make a cloth that's truly all handmade, you're in for a thrill! I started out spinning my weaving yarns to save money and to use up the piles of yarn I was spinning. Over fifteen years later, I still spin most of my weaving yarns just for the fun and the satisfaction.

HOLLY SHALTZ taught herself how to spin on a homemade drop spindle in 1986 while living in Heidelberg, Germany, with her family. After her husband retired from the Army in 1997, they settled in Michigan on a small farm, where they raise Shetland sheep and have a small market garden. In her spare time, Holly teaches spinning classes and designs websites.

Plying Wool and Silk to Make Plain Weave Fancy

BY MARY SPANOS

Notes on blending fibers by plying

The yarns in these scarves were plied from singles that had been spun from different fibers. One ply was wool or cashmere and one ply was silk. I hoped that the two plies in the yarn would shrink differently when each scarf was washed (wool usually shrinks more than silk) and increase the textural interest in the fabric. I was surprised to find that seemingly minor changes in the spinning and weaving of each scarf made the finished fabrics different. I expected that simply spinning one ply of silk and one of something woolly would turn out to be a foolproof trick for creating interesting fabric. What I found was that there are probably endless possibilities for designing fabric for garments based on yarn with plies that have different shrinkage characteristics.

FIBERS

The two-ply yarns in this series of scarves were all made of one ply of something woolly and one ply of silk. It all started with the pink scarf, made of one ply of Rose Petals, a lovely blend of wool and silk from Chasing Rainbows, and one ply of bombyx silk, which I dyed. The plies in the yarn used to weave the blue and green scarf were spun from Polworth wool from Rovings and bombyx silk. The yarn in the rust scarf was plied from one ply of cashmere and one ply spun from a painted silk brick that I had on hand, from Chasing Rainbows in a colorway called The Reds.

Blending fibers by plying is an easy way to combine the characteristics of two different fibers without dealing with the challenges of carding them together.

DYEING

Since I wasn't patient enough to wait to order color-coordinated fibers, each scarf project required dyeing to create fibers in complementary colors. For the pink scarf, I hoped that a ply of bright fuchsia silk would push the rosy shades of the wool blend toward a final fabric color that would resemble pink azalea blossoms. I dyed the vibrant fuchsia silk by immersion-dyeing a silk brick with Pro Chemical's Sabracron F Fuchsia dye (a fiber-reactive dye that works at room temperature and is very easy to use).

For the blue and green scarf, I prepared several dye-stocks starting with chartreuse, then progressing through darker shades of green to blue, using Pro Chemical's WashFast acid dyes (Bright Blue and Yellow 135). To dye the fleece I used a technique I learned in a dye workshop with Mercedes Tarasovich-Clark a few months earlier. After washing the 4 ounces of dirty fleece, I soaked it in an acid bath (6 tablespoons of citric acid crystals in a gallon of water) for about 20 minutes. I squeezed out the acid water and laid the damp fleece on a large piece of plastic wrap. Then I painted stripes with each of the dye colors, except for the lightest chartreuse. I rolled the painted fleece in its plastic wrap and then laid out a damp acid-soaked piece of silk brick on another piece of plastic wrap. I painted stripes of all the colors, including the lightest chartreuse, on the silk. I steamed the wool and silk in their plastic wrap packages for a half-hour, let them cool, rinsed the fibers, and then laid them out to dry.

After the wool dried I carded it with a drumcarder, carefully teasing open the locks and trying to do a good job in the first pass so that I wouldn't have to card the batts more than once. I didn't want to do too much carding because that would blend the colors together and I wanted to end up with variegated

wool roving that showed all the original colors.

Work on the rust scarf began with dyeing cashmere to coordinate with the purchased red silk brick. To dye the cashmere, I immersion-dyed it with Pro Chemical's Sabraset (Lanaset) Deep Red dye. I was careful to handle the wet top gently so I wouldn't tear the top into pieces or abrade the outer fibers. I immersion-dyed the top in my oven using steam-table inserts purchased from a restaurant supply company. The inserts provide enough water to dye 4 ounces of fiber, and three inserts will fit in my oven at one time, hence three simultaneous dye baths. Immersion-dyeing in the oven keeps me from stirring the pot too much, which has led to partially felted dyed wool in the past. Without much stirring, the dense cashmere top wasn't very evenly dyed, but, since the silk was variegated, I hoped a little variegation in the cashmere wouldn't be too noticeable.

Looking back on my dye choices after all three scarves were finished, I am happiest with the way the colors interact in the pink and rust scarves. I like having one of the plies a solid color, one variegated. Although the color choices in the green scarf are my least favorite, it turned out to be the most informative of the sample projects. I used the lightest of the silk colors in the hope of creating a sparkling accent, but it turned out to be the most dominant color. Dyeing the shiniest fiber with the lightest color seemed to exaggerate the amount of that color in the finished project. Now I wish I had used a lot less of it.

SPINNING

Before spinning any of these fibers on my SpinTech electric spinner, I pulled off a manageable length of top, about a yard long. Then I split that piece into thinner strips. I straightened the feathery edges of these strips by gently

tugging along the length of the top with my hands just over a staple length apart. Before spinning the Polwarth wool batts for the green scarf, I tore each one into strips and tugged them, working along their length just as for the top, to make the fibers neat and straight again. The soft cashmere top was so short that I had to be careful to tug gently to keep from pulling it to pieces.

The only real difference in the yarn for these three scarves was in the comparative sizes of the two plies, whether the two singles that made up the yarn were the same size or different sizes. For the first scarf I spun identical-size plies from the wool blend and the silk brick, so it was a balanced yarn. When I spun the singles for the green scarf, I unintentionally spun the silk ply slightly finer than the wool ply. This difference wasn't noticeable in the finished fabric, so I thought that maybe it didn't matter too much. When I spun the singles for the rust cashmere scarf, I was really in a relaxed mood about my spinning. I was having fun and didn't want to be too picky about anything. As it turned out, I spun 5 ounces of cashmere for one ply and only about 2 ounces of the silk brick. The silk was so fine that 2 ounces was enough to ply with all the cashmere singles.

So the yarn in the pink scarf was balanced, the yarn in the green scarf had slightly more wool than silk, and the yarn in the rust scarf was quite unbalanced, with the cashmere ply more than twice as fat as the silk ply. There wasn't an obvious difference in the visible proportions of wool to silk in the pink and green scarves but the rust scarf is definitely different. The smaller proportion of silk in the rust scarf adds sparkle to the matte cashmere surface instead of the obvious luster that is so evident in the pink scarf.

For the rust scarf, Mary immersion-dyed a cashmere top from *The Fold* before spinning it and plying it with silk from a dyed brick.

WEAVING

All three scarves are woven with a simple plain tabby weave on a floor loom, but the way I warped the loom changed and I think that affected the finished fabric.

When I wove the pink scarf, although I'd been careful about spinning a balanced and consistent yarn, I was fairly careless when I warped and wove the fabric. At that time I was trying to be relaxed and enjoy the process of weaving without getting too concerned about any particular part of the process. So my warping method was fairly cavalier; I made no attempt to wind the warp on with any tension, just combed the yarn to make it neat, laid it down, stepped around to the warp beam crank, and wound the warp on. I also chose a very loose sett for warping and weaving because I wanted to create a fabric with good drape (usually a close sett will create a stiffer fabric).

When the pink scarf came off the loom it was very textured, a result, I believe, of the warp threads being under a wide variety of tensions and the sett being very loose. The washed fabric looked like a terrible mess until I took it to my dry cleaner; professional pressing made an amazing difference. The contrast of shiny pink silk plies against the matte rose woolly plies coupled with the wool ply shrinking differently than the silk ply created so much visual move-

ment that the plain-weave fabric looked unusual and complex.

As I was planning to weave the green scarf, I hadn't figured out why the pink scarf had turned out the way it did. I thought that any fabric woven from a yarn made of one ply of silk and one ply of wool would turn out like the pink scarf. I didn't think too much about the sett, just used my no-tension warping method, and wove a fabric where the picks per inch were the same as the ends per inch. When this scarf was off the loom and the fringe was twisted and tied, I washed the scarf and anticipated that the stiffness in the fabric would magically disappear in the wash. The stiffness did not disappear. The washed, dried, and pressed fabric didn't have the same drape as the pink scarf because, I realized, the yarns are similar but the woven sett was differ-

ent. The pink scarf sett was very loose and the green scarf sett was fairly close. The green fabric still had the nice contrast between dull fibers and shiny fibers, but the weave structure was still visible. Maybe this was because there was less room in the close sett for the threads to be affected by the different shrinkage characteristics of the fibers when the fabric was washed.

By the time I wove the rust scarf, I'd figured some of these determinants, so I made sure that I used a loose sett for this fabric. But I hadn't figured out that my warping technique could also make a difference, and that had changed because I had sold my jack-

Mary space-dyed scoured locks of Polwarth fleece in a range of greens and blues for the green scarf and plied them with silk from a similarly dyed brick.



style loom and bought a Swedish loom. I also bought a video to help me learn how to warp a Swedish loom,¹ and it taught a warping technique that kept the warp under a lot of tension while winding on.

So the rust scarf turned out differently from both the pink scarf and the green scarf for at least two reasons. One, the rust yarn is different because there was half as much silk in the yarn as there was cashmere because I spun the silk ply so much thinner than the cashmere ply. Two, the warp threads were more consistently tensioned, so they added less texture to the finished fabric.

When the scarves were finished, I particularly liked the soft and well-draped fabrics in the pink and rust scarves. Although the green scarf seemed like a sad failure at first, it was really a great sample. I learned a lot and found something unexpected—a wool and silk fabric woven fairly firmly could make a very elegant jacket fabric, visually interesting and with just enough stiffness to stand up to tailoring, yet with enough drape to bend well in all the right places.

FINISHING TECHNIQUES

As each fabric came off the loom I decided how to finish the edges. Given

my no-stress attitude toward warping and weaving the pink scarf, the selvages were very irregular and distracted from the lovely fabric. I used left over fuchsia silk to spin a very fine, high twist two-ply yarn and wove narrow ribbons on my inkle loom which I sewed to the edges of the pink scarf by hand.

When I made the green scarf I wanted to see how a twisted fringe would work with the silk and wool yarn. Working from one edge of the scarf, I gathered two bunches of four warp yarns each and twisted each bunch in the same direction. I carefully let those two bunches twist on each other and tied a knot in the end to hold them securely. But the different shrinkage characteristics of the wool and silk plies made the plied bundles look a little messy.

The hemstitched edge on the rust scarf turned out nicely and was a much quicker edge treatment than spinning, weaving, and sewing tiny ribbons. I used some of the leftover red silk to spin a two-ply thread that is similar to millspun embroidery thread and found a nice hemstitch technique in an old embroidery book.²

MARY SPANOS is a spinner, weaver, knitter, and dyer who lives in Alabaster, Alabama, with her husband Michael and two good cats. She is grateful for the continuing encouragement and patience of her weaving teacher Pia Cusick.

Resources

Sabracron F fiber reactive dyes, WashFast acid dyes, and Sabraset (Lanaset) premetallized dyes are made by **PRO Chemical & Dye**, PO Box 14 Somerset, MA 02726; (800) 228-9393; www.prochemical.com.
Silk bricks are available from **Shadeyside Farm**, 109 Brown Rd., Oxford, NY 13830; (607) 843-8243; www.shadysidefibers.com and **Treenway Silks**, (888) 383-7455; silk@treenwaysilks.com; www.treenwaysilks.com.

¹ Ashenden, Becky. *Dress Your Loom the Swedish Way*, an in-depth study of time honored techniques. Shelburne, Massachusetts: Becky's Väv Stuga, 1998.

² de Dillmont, Thérèse. *The Complete Encyclopedia of Needlework*. Philadelphia, Pennsylvania: Running Press, 1972: 522, fig. 788.

Excited Yarns

BY LIZ GIPSON

A lovely leno scarf

When Liz wore her lovely leno scarf to work one day, a co-worker exclaimed, "Oh! You used excited yarns!"



During *Spin·Off's* 2004 Autumn Retreat (SOAR), I was fortunate enough to buy a half-pound of combed Polwarth wool from Rovings. Fortunately because it sells out quickly! A few steps from the booth I drew out my Elizabeth spindle from Greensleeves and started making yarn. As a member of the SOAR staff, I'm sure I should have been doing something else, but all that mattered to me at that moment was the fluff passing through my fingers. I knew that this yarn was destined for warp.

Throughout the conference, I continued to spin and ended up with a few balls of singles tucked in my bag when I got home. Over the next couple of weeks, I spun the remainder of the fiber on my Ashford Traditional wheel and ended up with bobbins of lovely singles ready for

my loom. The naturally energized yarn has found its way into various projects over the past few years. Recently when I wore this scarf to work, Ann Swanson (*Spin·Off's* photostylist and illustrator and a beginning spinner) exclaimed, "Oh! You used excited yarns!"

SPINNING SINGLES FOR WARP

You might not think that singles would be a good choice for a leno warp since the yarns have to stand up to a lot of abuse from the twisting of the warp threads over one another. But with the right fiber choice, proper preparation, and spinning techniques, singles can make fine warp. I've found that combed fine fibers of medium length (4 to 5 inches) such as Polwarth, Polypay, and New Zealand Halfbred spun with a short-draw method make good choices.

I used a rigid heddle loom so that the yarn wouldn't be abraded by the

Project Notes

Finished size: 5¼" × 46" with 4" fringe.

Fiber: 4 ounces of white combed Polwarth top from Rovings.

Warp: 200 yards of singles that measure 2,200 yards per pound and 22 wraps per inch.

Warp length: 75".

Weft: 100 yards of singles that measure 2,200 yards per pound.

Sett: 10 ends per inch (80 total ends).

Weave structure: Plain weave.

wire heddles and reed of a shaft loom. I like to add a bit of extra twist in my singles to give the finished cloth—as Ann might say—textural excitement. I don't want so much twist that the yarn will kink on the bobbin, and I don't need to worry about getting an exact amount of twist as long as I am consistent. All singles carry a little energy if they are not washed and set before using them. I found that the energy in the yarn held well over time.

LENO

Leno is formed, in this instance, by crossing warp threads in front of the reed before inserting a weft thread (see figure 1). This particular method of producing leno requires that you pick across the warp every third pass of the shuttle. It produces a lovely pattern. I enjoy manipulating the yarns by hand, but you may want to experiment with more efficient methods for producing a leno shed, such as tying the threads to a rod behind the reed or using a doup or bead leno technique (the latter two are more successful on a shaft loom).

WARPING

When weaving with high-twist yarns, you will lose about 30 percent of the width and, in addition, leno tends to produce more draw-in than other patterns. Add 35 percent to your desired finished width to calculate the total

number of warp threads needed for a leno pattern. Add 30 percent to the desired finished length to account for shrinkage and take-up in the length of the warp. The yarns that are tied onto the front and back apron rods are used as fringe, so there is no real loom waste.

Wind a warp of 80 ends, 75" long. Tie a choke 18" from the cross to keep the threads from being pulled unevenly during the threading of the rigid heddle. Center the warp for 8 inches and thread the rigid heddle using a stand or leave the rigid heddle in its neutral slot in the loom. After threading, move the rigid heddle to the neutral position, if it is not already there, and tie the choke to the front beam. Secure the warp to the back apron rod using a surgeon's knot for every inch of warp. Cut the choke tie and wind the warp onto the back beam using firm, even tension until the warp is in a position to tie onto the front apron rod. Tie the warp onto the front apron rod. (If you are new to weaving and these terms have you flummoxed, check out *Handwoven's* list of weaving terms at weaving-today.com; click on Free Resources and then Glossary.)

WEAVING

Wind a stick shuttle with the entire weft. Wind figure eights on either side of the shuttle to decrease bulk. Although the shuttle will be a bit packed at first, with leno it is better not to join wefts midway though the weaving process.

Start from the right and weave two picks of plain weave leaving enough length for fringe. *Using a pick-up stick and working in groups of two warp threads, lift the right warp thread over its neighbor to the left and insert the pick-up stick just enough to hold the warp threads in place. Continue working across the warp until all the threads are twisted and held secure with the pick-up stick. Tip the pick-up stick on end and throw the first shot, being sure to angle the weft at least 45 degrees. (Leno has a tendency to pull in the selvages, and angling the yarn will help prevent this.) Remove the

pick-up stick. Beat the yarn in place. Weave two more picks of weft. Your shuttle will now be on the left side. Again, working in groups of two, lift the left warp thread over its neighbor to the right and insert the pick-up stick just far enough to hold the threads in place. Work across the warp until all threads are twisted and held secure by the pick-up stick. Tip the pick-up stick on end, throw the shuttle angling the weft, and remove the pick-up stick. Beat the weft into place and weave two more picks. * Repeat from * to * until you have reached your desired length. End with two picks of plain weave.

FINISHING

Untie the warp from both apron rods and tie the ends in groups of two in an overhand knot at the fell of the cloth. Wash the scarf in lukewarm water with mild soap. Gently squeeze out the remaining water by rolling the scarf in a towel. Hang to dry. The yarn in the fringe will loosen its twist and return to its fibrous form at the ends—a nice finishing touch.

LIZ GIPSON is the former managing editor of *Spin-Off's* sister magazine, *Handwoven*. She gets excited about weaving with handspun yarn.

Resources

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Figure 1



2	2		X
1	1	X	
		1	2
		1	2

Leno is formed, in this instance, by crossing warp threads in front of the reed before inserting a weft thread.

Spinning Silk for Weaving

BY SARA LAMB

Use two-ply yarns that emulate reeled silk to make glorious warp-faced fabrics

Silk! The mere mention of the word conjures images of luxury. Silk has been the fabric of royalty and nobility for centuries, with its luster, drape, and soft hand.

Until the mid-eighteenth century, all silk fabric was woven of reeled silk, a particularly smooth yarn made from only the longest, strongest threads in the cocoon. Waste from the reeling process was originally used only for stuffing or batting. Then someone, somewhere (probably in France, Britain, or China) figured out that all the waste from the reeling process could be combed or carded and spun on machines. The “waste silk” that was spun this way was used for weaving second-quality fabrics and for machine knitting and needlework. Interest in and need for handspinning declined at the same time this machinery was developed, so there is no real tradition of handspinning silk in the west.

Spinning silk has become popular in recent years, and the fiber is available today for handspinners in unprecedented varieties and quantities. We may just be the first generation to have access to processed silk fibers and the interest to spin them. My goal is to spin a yarn suitable for weaving smooth, lustrous fabrics, and the key I’ve discovered is to emulate reeled silk as closely as possible.



PHOTO BY SHIRLEY BORBA

Sara says that while this is the way she actually sits while she’s spinning, she doesn’t recommend it since it causes her feet to fall asleep.

SPINNING SPECIFICATIONS

Fibers in yarn are held together by twist. The amount of twist and the finished grist¹ of yarns vary according to the intended use of the yarn. Weaving, knitting, crochet, and needlework yarns all require different levels of twist. Once the basic yarn is understood, the spinner is then free to push the limits of twist and grist to obtain special effects.

¹ Grist refers to the yarn size—the yards per pound.

Pilling can be a problem with silk yarns and fabrics. Tiny fibers work their way out of the twist and are abraded and rolled into pills on the surface of the fabric. Tighter twist helps control this, and in weaving, a close sett and a weave structure without large floats or gaps will help as well.

To emulate reeled yarn for weaving, I use only the finest top, sliver, or bricks I can find. The silk top I work with is either tussah (golden brown) or bombyx (pure white). Tussah is also called wild silk, and

bombyx is often referred to as domesticated silk. Tussah is generally coarser and has less luster, while bombyx seems smoother, finer, and softer.

Caps, cocoons, and mawata are useful for making novelty or weft yarns but are too fuzzy and unaligned to make a yarn useful for warp. If you do wish to use yarns made from caps for warp, consider creating a loose weave, combining the yarn from caps with smooth yarns, or using a warp sizing to minimize the effect of the hairy yarn.

Qualities of silk

The qualities that make silk so prized include luster, softness, elasticity and strength, as well as an ability to absorb moisture. But silk must be handled carefully to enhance and retain these qualities.

Luster is enhanced by a balanced twist in the yarn. The fibers that are most parallel to the length of yarn catch and reflect the most light. Under a microscope, silk is a long continuous filament with few, if any, breaks along its length. It is a triangular shaped fiber in cross section. These factors enhance silk's luster and hand while spinning, and carry through to the finished fabric.

The moisture absorption of silk is about 30 percent. This greatly aids the fiber's ability to absorb dyes, making it one of the more pleasing fibers to dye. Silk also absorbs impurities, such as metal salts, that tend to damage the fibers. "Weighted silk" refers to fibers that have been subjected to a process that adds metal salts, thereby changing the hand of the fabric, but also decreasing the durability of the fabric.

The elasticity of silk is good, but silk is less elastic than wool. Silk fibers can stretch as much as 10 to 20 percent when dry and 30 to 35 percent when wet. Silk has a breaking elongation of 20 percent (dry), and since there are no cross-linkages in the molecular structure, it does not regain its original length. Silk's ability to stretch has made it a high demand fiber for industry and in such uses as parachutes. Different silks stretch at different rates. Bombyx stretches differently than



tussah and even different batches of bombyx stretch differently from each other. For a large project, buy enough silk from one source to complete the whole piece.

Temperatures over 300°F begin to damage the molecular structure of silk fiber, and it may begin to discolor, turning yellowish. Iron silk cloth on a medium setting, or use a damp press cloth. Silk burns with a sputtering flame, leaves a crisp brittle ash, and tends to smell like burning hair or feathers.

Chemically, silk is a protein fiber, and as such, it accepts dyes formulated for wool. An acid environment damages silk fibers the least, and organic acids (such as those used by home dyers) are the safest for the fiber. Silk also accepts dyes formulated for cellulose fibers, which require an alkaline bath. Alkaline, however, damages the fibers, so use only a weak (2 percent) solution of soda ash when dyeing and be sure to wash it out afterwards. Chlorine bleach will dissolve silk. Silk is damaged by perspiration, which will weaken and discolor the fibers. It is also harmed by aluminum chloride, a chemical commonly used in antiperspirants. Ultraviolet rays from the sun destroy silk fibers. As little as six hours direct exposure may damage the fibers as much as 60 percent. Even oxygen is harmful to silk fibers and unless kept in sealed containers, silk will eventually break down. Silk is resistant to mildew and moths, but the carpet beetle will damage silk.

Spinning silk

PHOTOS BY SHIRLEY BORBA



I spin “off the fold,” holding the fiber over the index finger of my drafting hand. I pull off a comfortable length of top—about 6 inches—by holding a bit of top between my two hands and moving them gently apart until a section slips away.



If I am using a brick, I usually go further and split this 6-inch section lengthwise into three strips. Bricks and tops typically contain fibers of many lengths, all combed together.



I hold the 6-inch section loosely over my finger and spin off the fold. The first part of the top spins off the fold easily.



As I continue, the bundle of fibers becomes less organized, and I gradually hold the end of the bundle in the palm of my hand and control the drafting triangle with my thumb, index finger, and middle finger.



Because I am right-handed, I hold the bundle of fibers in my right hand and draft and control the twist with my left hand. I draft toward the orifice with my left hand (the right hand almost serves as a distaff, except those fingers are also controlling the fibers).

I move my hands around a lot as I am spinning. Because I am spinning for months on a project, I cannot hold my hands in one static position or I'd get repetitive-motion injuries. So I flip my fingers around, switch dominant hands, and generally fool around, all the while watching the drafting triangle and trying to maintain a consistent grist range and amount of twist.

When I get to the end of a tuft, I join the next 6-inch section by overlapping the fluffy ends. I control the twist in the yarn by starting with a pinch, and holding the developing yarn in my left hand between my thumb and index finger. It usually ends up that I am using only one finger to draft towards the orifice and control the twist. With yarn this fine, one finger is enough to pull fibers out of the bundle and stop twist from entering. Some spinners maintain that spinning from the fold creates a “hairy yarn” but I find it the most efficient method to spin the large amounts of fine yarn needed for a project.

I control the drafting triangle with the fingers of my right hand to ensure the fibers are feeding smoothly and as close to parallel as possible. This is the most important point to watch. There are occasional irregularities (such as variations in thickness and tufts of short fibers that need to be pulled off) with this method of drafting, but they do not seem to adversely affect the weaving process or finished fabric. In fact, I think that spinning from the fold works wonderfully.

SPINNING NOTES

I often spin lounging in an easy chair, the wheel to my left and my legs crossed, with my right foot treadling and my left foot slung over. This occasionally results in both legs going to sleep, and usually at that point the phone rings and I hobble over to it, if I don't fall flat on my face. I bought a double-treadle Lendrum to force myself to sit "properly" which has helped—but I find that I get antsy and I tend to spin longer on my other wheel. Mostly I keep my right hand stationary, and my left hand moves toward the orifice. When I get tired of this I switch hands. I go back and forth between watching the drafting triangle and spinning by feel. I can spin for hours if there's a good disaster on TV. O. J. Simpson's trial was a kimono in itself. So were the floods a few years ago. I also create spinning time by listening to books on tape, and we have a great community radio station here with several shows that I listen to faithfully.

Other spinners emphasize how smooth your hands must be when working with silk. I think this is less important with tops than with caps, but I do keep hand lotion and an emery board nearby.

I have two wheels—an Alden Amos Canadian Saxony and a Lendrum DT with the super-fast head. I use them, and the yarn from them, interchangeably. When I first got the Lendrum I had to adjust to its faster speed, but I can keep up with it now. For plying, I use Alden Amos's lazy kate—it has upright spokes that provide enough tension so that the bobbins don't spin too fast.

I spin the yarn for one project at a time. When I have spun and plied two bobbins, I run it directly onto the warping board, sit down, and spin two more, until I have enough yarn to warp the loom. When I have spun and plied enough yarn to prepare all the warp chains I need, I usually degum and dye them, but you may want to just wash them prior to dressing the loom.



Kimono #1, January 1997. This kimono includes two fabrics woven on different warps, both handspun bombyx two-ply silk yarns sett at 48 ends per inch. One warp was 11 yards long and 750 ends wide, the other was 3 1/2 yards long and 367 ends wide. The cardwoven and Peruvian pick-up bands used as trim were also woven on handspun two-ply warps. All used fine millspun silk weft. Sara thought this kimono would be her masterpiece, but when it was done, it was too busy for her taste. So she decided to make another—*Kimono #2*.

DEGUMMING SILK

Silk occasionally smells "fishy" or seems stiff and unyielding, especially after wetting or dyeing. This is caused by sericin left on the surface of the fibers. This substance, extruded with the fiber by the silk worm, can be removed in a warm, mildly alkaline

soap and water bath by a process called degumming. Sericin may inhibit the take-up of color so it's best to remove it before dyeing. Degumming the fibers in staple form is difficult, so I usually do not dye silk top or bricks prior to spinning. I spin and ply first, then degum and dye the yarn.



Kimono #2, August 1997. The colors and foiling for this fabric came to Sara in a dream. This kimono is one of Sara's favorites and she wore it at her wedding. For the main fabric, she made a handspun bombyx silk warp 13 inches wide and 11 yards long, using 624 warp ends at 48 ends per inch. A fine millspun silk was used for the weft. The warp for the band was $4\frac{1}{4}$ inches wide and $3\frac{1}{2}$ yards long. The foiling was added as a surface design treatment after finishing the fabric.

I always degum the warp before I dye it—even well prepared bombyx top has sericin still in it. I use Dawn dishwashing soap or Orvus paste and a good amount of hot water, adding just enough washing soda to bring the pH slightly alkaline (I test the pH with litmus paper). I heat and soak the silk in this solution in a crockpot set on low at least overnight. If the water is very yellow and smells of sericin the next day, I repeat the process again before dyeing the warp. Since I work with my warp yarns in chains, the small size of the crockpot isn't a problem.

DYEING

I dye some of the yarns as top, and some I paint or dye as yarn. The painted top gives a “tweedy” look to the colors, while painting the yarn keeps colors more distinct. I use Sabraset dyes and mix them to a 1-percent solution. Then I either paint the top or paint the yarn. Occasionally I will dye the yarns in an immersion dyebath. I try to dye a 3-percent depth of shade, to match the intensity of the 1-percent direct application of the painted yarns.

WARPING, WEAVING, AND FINISHING

All my fabrics are warp-faced plain weave—allowing the dyed, handspun warp to shimmer. I sett the warp at 48 ends per inch, with 4 ends per dent in a 12-dent reed. I determine the sett by wrapping the yarn loosely around a ruler, and pushing the yarns together so they just touch. I make a yarn that is 40 wraps per inch. If I sett the warp at 20 ends per inch, this yarn would make a balanced plain weave using itself as weft. I use a finer weft, and so I want the warp sett closer to cover it. As I measure a warp, I allow about 5 percent extra for shrinkage.

Some people size their silk warps. I don't because I use a smooth, plied

yarn. If you're using a fuzzy, singles yarn I recommend hair spray. After you've warped the loom, spray cheap hair spray on the yarns while the shed is open, between the reed and breast beam. Let it dry and then continue to weave. Since I warp front to back, occasionally static electricity will build up in the warp yarns as they are wound on. I simply spritz them with a little water, and tie on. I have found that static electricity isn't a problem with the yarns once they are under tension.

For weft, I use a very fine commercial silk (Lunasea's 140/2). It doesn't



Sara dyed the red warp chain as top and then spun the yarn. She painted the pink chain after it was spun and the warp was wound off.

show in the finished fabric. Because the weft yarn is so fine and the warps are under tension, the fabric hardly draws in as I weave it and I don't need to use a temple.²

After the fabric is woven, I machine

² A weaving tool that is used to maintain selvages—it has two bars with teeth that hold the edges out.

stitch a basting line at each end to secure the warps before I finish the fabric. I then wash the fabric in a regular cycle in the machine, using hot water for both the wash and rinse cycles (and pace nervously until it's done). Then I partially dry it in the dryer (pacing again). I finish the drying with my old 1950s rolling mangle, but you could use an iron. After the garment is constructed, I hand wash it and hang it to dry, then finish the drying with my iron.

THE MOTIVATION BEHIND THE ART

I wear my garments all the time. When I started, I was interested in creating a wardrobe of my handspun garments, but by the time I had thirty or so cotton kimonos and about twenty shirts and a few dresses I lost interest in quantity. Now, I aim for one handspun silk kimono a year, plus a few commercial silk ones.

I work on some part of the process every day. Sometimes I think that the dyeing is my favorite part because it is the most dramatic and you can see the results so quickly. But when I think about it, I really love the whole thing. I love warping because that is when I start to see if my planning will all work out. Weaving the fabric is meditative like spinning. Sometimes, though, I have to set goals for myself, like “weave for an hour, then you can have tea.” After I wash the fabric, I have to force myself to sew the garment. By this time, any shortcomings in the project are evident, and I'm already planning the next and thinking things like “next time the stripes will be bigger, next time the weft will be heavier so the fabric is more sturdy,” or “now I need a green one.”

Many years ago, when I wanted to learn to spin, it took me a year to find



a teacher, buy a wheel (an Ashford kit via mail order) and learn to spin. I vowed then that I didn't want to see others so frustrated as they tried to learn to spin, and I have been teaching ever since. I love teaching best of all—and while I'm making things, I'm thinking of ways to communicate what I have learned. There are many resources available now that weren't available when I was learning. When I couldn't find the information I wanted on spinning silk, I started a process of exploration that has brought me here. I think the next avenue I explore will be carpet weaving.

SARA LAMB is a spinner, dyer, and weaver from the foothills of the Sierra Nevada Mountains.

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Kimono #3, January 1999. Sara likes this heavier fabric because the cotton weft gives the garment more body. She can wear this kimono as everyday wear, as it is sturdy and not quite as fancy as her other garments. Body of fabric: Handspun two-ply bombyx silk sett at 48 ends per inch, 11 yards long. Band: Handspun two-ply bombyx silk, sett at 48 ends per inch, 3½ inches wide and 3½ yards long. Peruvian band: 20 warp ends, 60 inches long. The weft for the body fabric and both bands is 20/2 millspun cotton.



Vest, March 1998. Sara made this vest so she'd have something to wear to the summer conferences she attends in hot climates. It was woven on two warps, both handspun two-ply bombyx silk sett at 48 ends per inch, and both woven with fine, millspun silk weft.

Cotton Pillowcases

BY RITA BUCHANAN

Pleasant spinning leads to sweet dreams



Handspun pillowcases are luxurious yet practical. These are woven in M's & O's, using about 6,500 yards of two-ply Pima cotton yarn, sett at 32 ends per inch.

For years I've daydreamed about making handspun, handwoven bed linens, inspired by the well-worn, skin-soft sheets I've seen in early-American museums. The incentive to get started came when I was given a couple pounds of Pima cotton top. Coiled loosely in its bag, this fiber was so sensuous and alluring that I wanted to lay my face against it. Ah-ha! Why not begin my bedding project with a set of pillowcases?

Now, having made this start, I'm all the more impressed by those antique sheets and the amount of spinning they represent. That's because the production of bedding is primarily a spinning project, and pillowcases are a mere swatch compared to sheets. I spent over 120 hours making the yarn for these two pillowcases. At that rate, imagine how long it would take to make a set of sheets.

But it took only a few evenings to warp the loom and weave the pillowcase fabric, and less than an hour to sew them. Because the weaving and sewing are so straightforward, I recommend pillowcases as a project for spinners who want to weave with handspun but hesitate to design garments. Pillowcases are easy compared to clothing. They're just rectangles, with no curves or darts, and they don't have to fit exactly.

The main incentive is that homemade pillowcases feel wonderful! Steve and I have been using these for a year now and still find them remarkable. Night after night, we go to bed, turn out the light, say goodnight, and then a moment or two later one of us will sigh, "Um, I love these pillowcases." What a luxury to end each day, and start a new one, in such comfort.

CHOOSING FIBER

The Pima cotton top I used was from a sample batch processed and combed at Texas Tech University in Lubbock,



Two-ply yarn makes a trouble-free warp and is easy to weave. Don't worry about minor slubs and inconsistencies that show up in a skein; you'll never see them in the finished fabric. Do you notice the different shades of white here? That's typical. Even "white" cotton changes color when you wash it. The unwashed fiber and yarn have a warm, creamy tint but the washed fabric has turned a cooler, grayish white.

Texas. This particular top is not for sale, but I've bought similar combed tops, labeled Pima, Egyptian, or Sea Island cotton, from other sources. All are uniform and pure, with fine fibers up to 1½ inches long. Unfortunately, combed cotton is not as readily available as carded cotton slivers. When I find cotton tops in a vendor's booth at a conference or in a catalog, I buy a

pound or two for my stockpile.

Carded slivers of Pima, Acala, Upland, or natural-colored cottons are easy to find and inexpensive. Many suppliers offer them. Slivers tend to be less dense than tops and are usually easy to draft regardless of fiber length, which may be as long as 1½ inches or shorter than ½ inches, depending on breed. Unfortunately, carded prepara-

tions vary in quality more than combed tops do. Some are flawless, and good, carded cotton is delightful to spin. But many carded batts and slivers are marred by noils (snarled bits of short fibers that rise to the surface of the yarn and form pills) or contaminated with dark, gritty flecks of seed hulls and other vegetation that make the yarn look dirty. Look for noils and vegetation by fanning a portion of sliver into a thin ribbon and holding it up to a window or light; if you see a lot of these impurities, set that fiber aside and shop for a better quality preparation before starting on a project like pillowcases.

As for quantity, I used about 14 ounces of cotton for my pillowcases. You'll need more if you spin a thicker yarn than I did, less if you spin thinner.

HOW THIN IS THIN ENOUGH?

I'll elaborate on the topic of yarn size because it was a concern in this project. I wanted the pillowcases to feel smooth next to the face, and wondered how fine I had to spin in order to achieve that luxurious feeling.

The comparisons are daunting. Early -American bed linens were typically woven of linen singles sett at 40 to 60 ends per inch, or sometimes as many as 80 ends per inch. Contemporary bed linens are rated by the total number of threads per inch, adding warp and weft together. A rating or count of 200 is on the low end of the scale for modern bedding. Top-quality sheets have as many as 400 threads per inch; if woven square, that means a sett of 200 ends per inch. Wow.

Fine fabrics woven from thin yarns are supple and elegant, but I'm a realist. The thinner you spin, the more yardage you need, and the more care it takes to spin each yard. I tried to be honest with myself about how many hours I wanted to spend on this project. My attention span is long, but it's not infinite.

Over the years, I've made several

Homegrown, handpicked cotton is clean and pure. The sample that looks like a butterfly is one cottonseed with its fibers combed out to the sides. The fibers are about $\frac{5}{8}$ inch long.



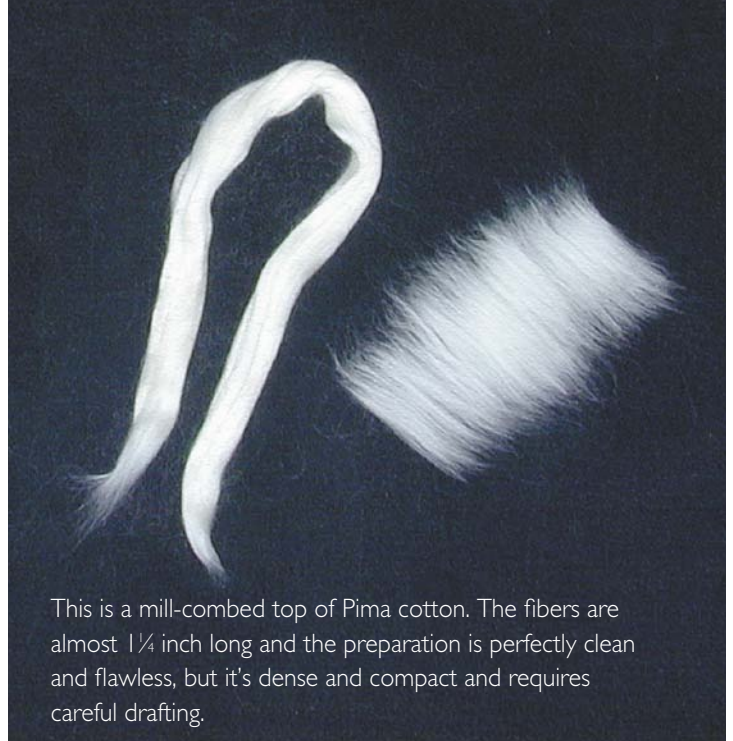
This is a mill-carded sliver of Pima cotton. It's uncompacted and easy to spin, and the fibers are about 1 inch long and fairly fine, but the sliver is contaminated with noils and dark specks of leaf litter, seed hull, and other vegetation.



This is a mill-carded batt of Upland cotton. It's loose, airy, and easy to spin, but those white specks are noils, and the fibers are quite short, less than $\frac{1}{2}$ inch long, and feel relatively coarse for cotton.



This is a mill-combed top of Pima cotton. The fibers are almost $\frac{1}{4}$ inch long and the preparation is perfectly clean and flawless, but it's dense and compact and requires careful drafting.



Here are different preparations of white cotton, laid out so you can see the quality and the fiber length.

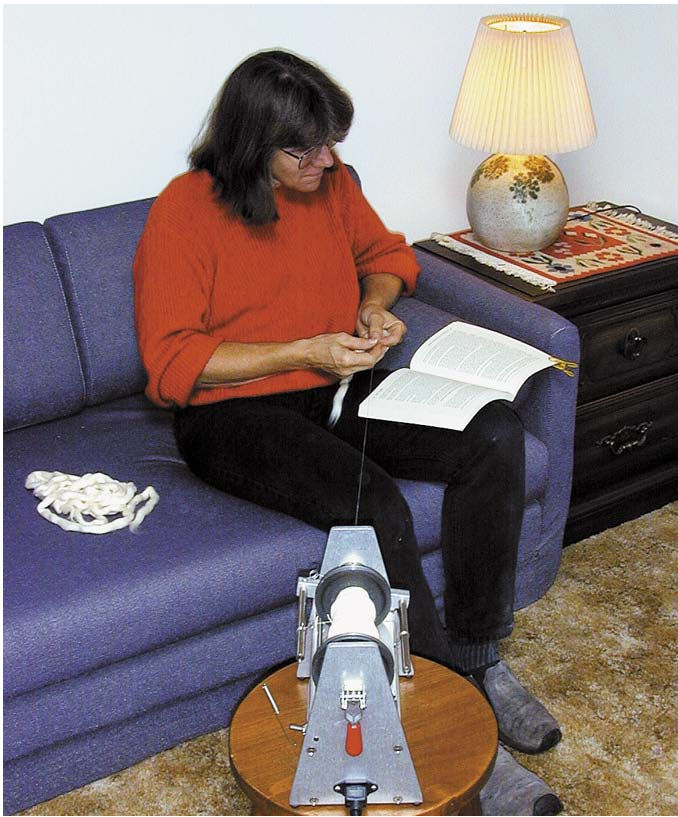
handspun, handwoven cotton blouses, sett at between 20 to 30 ends per inch. The fabric in these blouses isn't thin, but it has a soft surface—the blouses feel like T-shirts or flannel shirts. I took one of these blouses, laid it over my pillow, and slept on it one night. It felt very comfortable against my cheeks, so I compromised on fineness. I knew I'd rather complete a pair of medium-weight pillowcases than get started on super-fine ones and abandon the project partway.

SPINNING

Most cotton tops and slivers seem to draft more uniformly, with fewer lumps and slubs, if you pull from one end rather than the other. It's hard to predict by looking which end is better, but you can tell soon after you begin spinning. I usually pull a short piece off the preparation and try spinning it from both ends to see which one works best, then position the remaining fiber in its bag or basket so that the “good” end is up. That way I don't have to recheck each time I start to spin.

There are many approaches to drafting cotton (or any other fiber). I always start a new project by sampling, and choose whatever drafting style gives me the best sense of comfort and control. Normally I use one or another long draw with cotton, but when I tried that with this combed Pima I kept getting frustrated by slubs and breakage.

Instead, I turned to a short draw, done with my hands resting in my lap and touching each other. I cradled the fiber gently in my left hand. My right



Rita sat on a sofa and read as she spun this cotton yarn. She used a SpinTech electric spinner, which has a foot pedal that controls the flyer speed.



Rita spun this combed cotton with a short draw, using a dainty, stroking gesture. With hands touching, she simply moved her right thumb back and forth about $\frac{3}{4}$ inch, alternately pulling out fiber, then letting it twist.

thumb did all the work. I pinched the yarn directly in front of my left thumb, drafted forward about $\frac{3}{4}$ inch by rolling my thumb along my index finger, then lifted my thumb to let the twist run into the new yarn, and immediately repeated the gesture. Pinch, roll and pull, release. It was an effortless movement and required almost no attention to produce a fine, strong, uniform yarn. It was so easy and restful that I sat on the sofa and read as I spun for an hour or two every night, stopping only to turn the page, slide the yarn hook along the flyer arm, or check the yarn's size and twist.

I used a Spin-Tech electric spinner for this project, and that was a big part of the pleasure. The spinner is soothing because it is so steady, with absolutely no vibration, jerking, or hesitation. I set the foot control for the fastest speed I could keep up with,

based on initial sampling. Then to spin, all I had to do was push my foot down all the way and keep it there. It surprises me to admit this, since I never think of treading a wheel as tiresome work, but when I'm using the spinner, I sit and spin for much longer periods than I do with my wheel.

STAYING ON TARGET

Consistency was a challenge in spinning this yarn. I had to keep pushing myself to stay thin and to use enough twist, otherwise the yarn would get thicker and softer. I always checked the yarn as a two-ply, since I was planning to use it that way and also because it was easier than handling the singles. At least once or twice an hour I unwound some yarn from the bobbin, let it double back on itself into a two-ply section about 1 foot long, and compared that with a sample I had set aside. I compared twist by

looking at the two yarns, and compared thickness by looping them together and running my hand along them to see if I could feel any difference. (For more on this technique of comparing yarns, see "An Easy and Accurate Way to Compare Yarns," *Spin-Off* Summer 1999: 48–53.)

Once or twice a week I unwound enough yarn from the bobbin to make a two-ply sample long enough for measuring. I tested this on the McMorran balance, where a 75-inch sample corresponds to a grist of 7,500 yards per pound, which was my goal. Then I took the same sample and wrapped it around a dowel, aiming for an average count of 64 wraps per inch. Using these different approaches to checking my yarn was redundant but reassuring and punctuated the hours of spinning. When the yarn deviated from my goals, I didn't unwind and discard any of it, I just tried to get back on track as I proceeded.



Project Notes

Finished size: Two pillowcases, each 20 by 28 inches.

Fabric structure: M's & O's. See draft on next page. This fabric is reversible; it looks the same on front and back.

Warp and weft: Handspun two-ply cotton at 7,500 yards per pound. Weaving two pillowcases requires a total of about 6,500 yards, or 14 ounces, of this yarn.

Warp dimensions: 3½ yards long, 1,032 ends wide.

Sett: 32 ends per inch.

Beat: About 30 to 32 picks per inch.

Take-up and shrinkage: About 10 percent in both length and width, after fabric was machine-washed and dried.

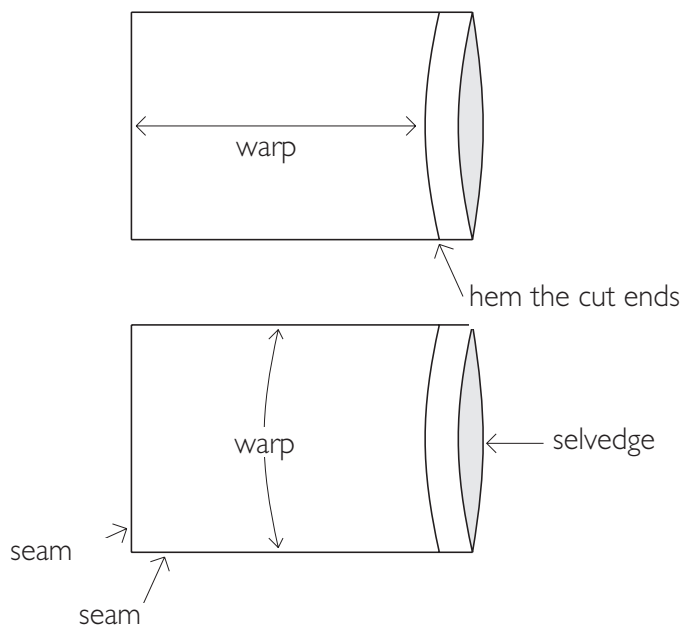
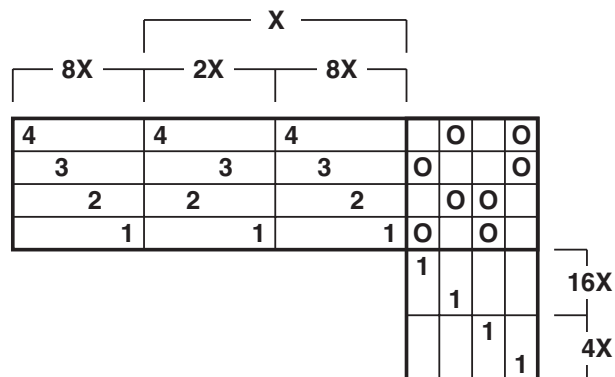
Assembly: To make a pillowcase, cut a length of fabric about 42 inches long. Fold it in half and seam the cut ends together, sewing ½ inch from the edge. Turn inside out and press the seam flat, then sew another seam ⅜ inch from the edge. This encloses the cut warp ends and makes a secure, fray-proof seam. Examine the selvages; probably one looks better than the other. Use the prettier selvedge for the open end. Sew a ½ -inch seam at the other end, so the less attractive selvages will be hidden inside. Turn pillowcase right side out and press again.

I weighed out one-ounce portions of the fiber before I started. Finishing each portion was like reaching a milestone and satisfied my need for a sense of progress. When I had spun about half the fiber, I plied that much, then I spun and plied the rest. Plying, like spinning, was a slow but simple process. I moved from the sofa to a chair so I could set the lazy kate on a table behind me, and I maintained a steady, back-and-forth hand movement, inserting enough twist to match the two-ply sample I had been using as a standard.

PLANNING, WEAVING, AND FINISHING

I measured store-bought pillowcases to decide how big to make mine, then planned the warp (see Project Notes), allowing for seam allowances, take-up, and shrinkage. To avoid the bulk of a hem at the open end of the pillowcases, my layout puts a selvedge there. I like using selvages as exposed edges; they're neat, sturdy, and simple.

I had originally planned to weave the fabric in tabby, or plain weave, and threaded the loom for that, but



after weaving a few inches I hesitated. Plain weave seemed too plain. So I took it out, rethreaded for M's & O's at the same sett, and then wove off the fabric. The weaving was uneventful and stressless, because the two-ply handspun behaved beautifully, with never a broken end or snarl.

I didn't even wash the yarn before weaving and I certainly didn't boil it. (There's no need to boil cotton; that's an old spinster's tale.) But when the fabric came off the loom, I ran it through the washer and dryer twice, using the hottest settings, to preshrink and soften it before I cut and sewed the pillowcases. I've laundered them once a week for over a year now and they seem to soften continually, but they haven't shrunk noticeably since I sewed them.

RITA BUCHANAN of Connecticut, is the former Associate Editor of *Spin-Off*.

Variations

My pillowcases represent just one of countless possibilities. Here are some ideas for designing your own version.

- ▶ **Fiber.** Instead of cotton, you can spin flax, ramie, hemp, rayon, silk, or blends of any of these fine, comfortable, easy-to-wash fibers.
- ▶ **Yarn.** I used the same handspun two-ply for both warp and weft. You can save time by using two-ply warp and singles weft, singles for both warp and weft, or a mill-spun warp yarn with handspun weft.
- ▶ **Color.** If pure white is too plain for you, consider dyeing some or all of the yarn. Then you can weave solid-color fabric or make stripes, checks, plaids, painteds, or other color designs. Fiber-reactive dyes such as Pro-MX or Sabracron are easy to use and work very well on cellulose fibers.
- ▶ **Weave structure.** Simple, snagfree (no long floats), stable structures such as plain weave, twills, Bronson spot, and M's & O's all work well for pillowcases.
- ▶ **Layout.** If your loom is narrow or if you want to hem the open end on your pillowcases, you can turn the layout so the warp runs length-wise. For two pillowcases, make a warp 25 inches wide by 5 yards long. Use the selvages for the side seams, and work rows of hemstitching to mark and decorate the hemline.
- ▶ **Trim.** You can spin more yarn and knit or crochet a lace edging or inset for the pillowcases, or dye some yarn and embroider a monogram or other design.



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Spinning Natural Colored Cotton for Dish Towels

BY GISELA EVITT

Using up odds and ends to make beautiful and useful gifts



Gisela Evitt makes dish towels whenever she feels that her yarn shelves are overflowing with odd lengths of handspun and millspun cotton yarns. She likes to have the towels on hand to give as gifts while she's traveling or during the holidays.

It all began with a file-box full of handspun cotton in all its natural colors (white, cream, greens, and browns), in big and little skeins. Some yarns were as fine as spider webs and some were as heavy as sturdy twine. But there was not enough of any one yarn for a project. When too many partial cones and spools of appropriate yarns clutter my shelves, I get inspired to design and weave a set of dish towels. I plan an interesting sequence of stripes, determine the number of ends of light, medium, and dark, and then plug in whatever goes nicely from the odd remnants on my shelves.

Dish towels make wonderful gifts, so this is an exercise I repeat periodically. I always put on a warp long enough for six towels and, to avoid boredom, never weave two the same.

Towels need a certain minimum weight and thickness to be useful (something similar to a commercial 10/2 or 10/3 yarn). So the yarns can't be too fine and, as I spread out the myriad skeins from my cotton box—products of countless workshops, demonstrations, experiments, and the like—I find very few that meet even that modest requirement of grist. So I sort the collection by color, lay aside the few skeins that do have adequate yardage and grist to use as singles weft for towels and wind the rest onto large paper quills on my electric bobbin winder.

Then the fun begins as I spin two- and three-ply yarns from these singles stored on quills on my modified lazy kate, turning them into all sorts of yarns sturdy enough to serve as warp while also mixing color, texture and grist at will. The result is a wide choice of smooth, textured, plain to varicolored yarns ready to be translated into interesting warps. I finish all my new skeins with a hot, soapy wash and lay them out to dry.

When combining varied cotton yarns, one has the assurance that their shrinkage, elasticity and general behavior will be pretty much the same, whether spun



from roving, unprocessed loose fiber, puni (an Indian term for a cotton rolag), or carded mass.

In this project, I had enough yarn for two seven-yard warps in two different stripe arrangements. To fill out some of the stripes, I used a little commercial, unmercerized, unbleached, natural cotton, and I used the same commercial yarn for weft in several of the dozen towels because this collection lacked enough yardage of any one kind for so many towels. I used rag wefts to weave spacers (less than one inch) between

towels (cardboard strips or plastic bags will do nicely, too). Because I do not have ready access to a sewing machine, I whipped each towel at beginning and end with an overhand stitch. That way, when the long woven strip comes off the loom, I can simply cut down the center of each separator to free the towels. I wash the towels vigorously in hot, soapy water, then hang them over the shower rod until they are no longer dripping. I give them a good, hot pressing while they are still damp, and then they are ready to hem. What with shrinkage and

hemming, the finished towels measure about thirty by eighteen inches.

GISELA EVITT has been a weaver since 1965 and learned to spin five years later when a friend “parked” her beautiful wheel in Gisela’s home when she left on a year-long trip abroad. Gisela’s husband Bill and their three young, curious boys soon goaded her into exploring this strange machine, and by year’s end all five of them could fashion a thread of sorts. Soon Gisela was teaching the craft regularly in a Bay Area weaving supply store. Now she weaves much of her handspun yarn—cotton, wool, silk, cashmere, angora—into towels, runners, scarves, and afghans.

Project Notes

Finished size: 30 by 18 inches (on the loom, the towels measure 36 inches by 20, and the width in the reed is a bit over 20 inches).

Fiber: Natural colored cottons.

Warp yarn: 2- and 3-ply cotton yarns measuring 36 wraps per inch, 3,900 yards per pound.

Weft yarn: Handspun singles or commercial 2-ply yarns.

Sett: 20 ends per inch, sleyed 2 to a dent in a 10-dent reed.

Weave structure: Straight twill.

Notes: My standard setup for towels can be adapted for a loom with 4 or more harnesses. On 8 harnesses I thread 51 repeats of straight twill (I use an odd number so there is a central stripe), which requires 408 ends in all. My own loom has 10 harnesses. I use the extra 2 harnesses solely for threading 2 ends at each side in plain weave for good selvedges, no matter the twill treading. Thus my warp totals 412 ends. At the start and end of each towel I weave $\frac{3}{4}$ inch with a fine cotton weft to make the turn-under part for a 1-inch hem. A 7-yard warp gives me 6 towels, each 35 or 36 inches in length.



Gisela plies singles together to get the grist of yarn she needs for her cotton towels.

SPINNING COTTON

Cotton has the reputation of being difficult to spin. That may be true if your experience is limited to spinning long fibers, but I find that even then spinning cotton is not difficult, only very different. In many cultures, especially in warmer areas where wool is not practical, cotton is the natural fiber of choice.

In truth, cotton fibers are very short compared to wool. They usually range in length from $\frac{1}{2}$ to at most 2 inches or so, while wool is seldom as short as 2 inches and may range up to 10 inches or more. Cotton's shortness means that the fibers need much more twist per inch than long fibers in order to hold together. Also cotton must be spun into a finer yarn so the twist can hold each fiber in place. If the yarn is too heavy, the cotton fibers may be too short relative to the

diameter of the yarn to be gripped firmly by the twist.

I spin cotton almost exclusively on a Scotch tension wheel with flyer lead. I let the twist take the fiber out of my hand, either pulling back on the fiber-holding hand or pulling the finished yarn toward the orifice with the other hand. As with any yarn, treadling speed and winding-on speed must be coordinated. This method works with all cotton fiber preparations, from the raw cotton boll to commercial sliver.

The drafting triangle for cotton is so small that it is difficult to see and, in effect, the approaching twist almost eats the fiber out of one's fingers. The hand holding the fiber source simply supports it and keeps it from falling on the floor. Clutching the fiber source too firmly prevents the smooth flow

of fibers toward the orifice as the twist converts them, like magic, from a loose and disconnected mass into a cohesive length of yarn.

The character of the final yarn (smooth or textured) depends much more on how the fiber was prepared than on how it was spun. Naturally, the amount of twist that goes into the yarn (beyond the minimum necessary for the yarn's basic integrity) is up to the spinner and is a major factor in determining the characteristics of the finished yarn.

So, find a comfortable chair, preferably with resting places for your arms, sit back, and begin treadling on your well-oiled wheel. Let that eager, active twist eat the fuzz right out of your hand. With a bit of practice you will find spinning cotton relaxing and intoxicating.

Spinning Flax into Linen

The easy way

BY JUDE DAURELLE

Jude spun the linen yarn for these towels and table runner as samples to use when she teaches spinning linen. She wanted to demonstrate the difference between millspun linen and handspun linen. Jude warped the loom with the millspun linen and wove the towels (1 and 2) with millspun yarn and then wove the table runner (3) with handspun linen yarn. Jude adapted Gayle Bingham's classic dräll pattern from *A Weaver's Book of 8-Shaft Patterns*, (Loveland, Colorado: Interweave Press, inc. 1991, page 55).

I fell in love with linen as a teenager when I ironed the family linens. Later, as a new spinner, I just knew I would take to spinning flax into linen thread even easier than I had taken to wool and silk. I expected to be a natural! But I was not. Properly dressing the distaff seemed an inscrutable process. First, I had to add extra pieces to my wheel. Then I tackled tying the linen to the distaff using ribbons and newspaper. Next, I attempted to spin while balancing a small bowl of water on my wheel. I felt like I was trying to pat my head and rub my belly at the same time. After trying unsuccessfully many times to get everything right and spin a good thread, I knew I had to simplify the process.

About that time, I stumbled onto a little book, *Handspinning Linen*, by Olive and Harry Linder. The Linders describe a method for spinning flax using nothing fancier than a spinning wheel and a small towel to hold the fibers. The technique they propose is almost identical to spinning worsted wool yarns from combed top using the English-style short draft. Following their method, I started producing good, sturdy, and useful linen yarns right away. The yarns were smooth and had none of the lumpy, tangled, and hairy joins that I hated when I was trying to spin with the distaff. I found that it was easy to spin a fat yarn using the Linders' method and later when I wanted a thin yarn, I discovered that spinning a thin yarn was even easier.

SPINNING LINEN THE EASY WAY

I use the same tools for spinning linen that I use for any other fiber—a lap cloth, a dog comb, a small flicker with the regular short carding cloth used for wool handcards, several spinning bobbins, a spinning wheel capable of wheel to whorl ratios from 10:1 to 30:1, and a colorfast spinning towel or old cloth. I use the same skeining and

blocking system that I have used for all my other spinning. For plying I use the tensioned lazy kate that came with my wheel.

Generally, I spin from commercially prepared line flax stricks. Today, most strick flax has been processed with chemicals and is a golden blonde color. Some line flax (the best flax available) is processed naturally in water to *rett*—or *rot*—the undesirable parts of the flax plant away from the long strong cellulose fibers. This flax is usually gray or dark tan and is softer, shinier, and sometimes much finer than line flax that has been chemically processed. I always look for lustrous line flax because I've found that it is stronger than flax that lacks shine and luster.

GETTING STARTED

Choose at least one strick of linen to make samples. I set aside about a third of the strick to make a large sample of my final choice yarn so that I have enough to weave or knit swatches.

Untwist and open the strick. Find the root end, the one that is the hairiest and bent. The other end is the growing tip and has finer, softer fibers. While holding the root end firmly, separate a bundle about the diameter of a quarter from the strick. Shake it out to remove any of the bits and pieces of straw (or *boon*).

Now smooth the fibers back into place together and place one hand firmly around the root end of your bundle. While still holding firmly, place the root end on your lap cloth. Using either your flicker or dog comb, and starting at the very tips, comb the tips from about one inch to the end. Move the flicker up another inch and comb again. Don't be surprised if you pull out some tangled fibers from the strick. Put them aside for later.

Lay the spinning towel across your lap and place the flax bundle on top with the root ends just slightly overlapping one edge. Fold the towel in thirds over the bundle and then fold the towel back about one inch where

you overlapped the edge. Leave the towel on your lap for a moment while you prepare your wheel for spinning.

Set your whorl size at about 10 revolutions per treadle for your first thread. If you have the option for Scotch tension, this is a good time to use it because you can first set the overall tension and then make fine adjustments with the Scotch tension as you spin. Set the tension tighter than you would for wool but not so tight that it drags the fibers out of your hand.

SPINNING A FINE LINEN YARN

Cup the towel and fiber bundle loosely in your fiber supply hand, with hand and fiber resting lightly on your lap, the fiber weighted down with your forearm and the root end facing your other hand and the orifice. If you are wet spinning your flax, this is the time to lick your fingers or dampen them with water. Lay the starter cord from your wheel bobbin on top of the fiber bundle just lightly on the inside edge (your body side rather than the wheel side) and overlapping about two inches of the tips of the fibers. Hold the starter cord in the drafting hand and move your fiber supply hand up to the fold in the towel. Close your fiber supply thumb and forefinger medium tight around the fibers and the bottom edge of the starter cord. Start the wheel spinning and treadle about two times with the thumb and fingers of your drafting hand held together tightly. The twist must not travel into the fiber supply. With your drafting hand, separate four or five individual fibers from the edge of the bundle nearest your body. Gently pull these few fibers about two inches straight out of the fiber supply while being careful to not let any twist travel down the bundle. Hold the remaining fibers in place next to each other. Now, just as you would spin wool with the short draft, move your drafting hand down the yarn you just drafted, smoothing the yarn as the hand returns to the original position. This is how you will make the yarn.

No matter how tightly you hold the thread, some twist will always slip through your fingers into the fiber supply. This twist is good because the fibers you just drafted into the yarn will each catch onto a buddy, and in this way you will draft a few new fibers into the yarn each time you smooth the yarn and bring your drafting hand back to the fiber bundle. What is not good, though, is that sometimes the twist will pull too many new fibers into the yarn, so you must continue to control the twist by keeping the fingers of your drafting hand fairly tightly clamped down on the fibers. Those at the folded edge of the towel may tangle up, especially when you are first learning. Just use the flicker or dog comb to straighten them out.

To keep making new yarn, simply pick up two or three more individual fibers from the side of the bundle closest to your body and pull them up parallel with the fibers already in the yarn, smooth back on all the fibers, and return your drafting hand to its original position. Treadle once when you pull the fibers up and once again as you smooth them back (again, just as you would to make worsted wool with the short draft). If your yarn drifts apart before it winds onto the bobbin, you can add an extra treadle to each cycle, or you can change to a smaller whorl for a higher ratio. If the flyer pulls the yarn out of your hand before it has enough twist to hold together or you find that your hands get tired from holding the yarn and fibers too tightly, you can tighten the tension. If the yarn kinks up before it winds on, either use a bit more tension to get faster take-up, or change to a larger whorl to get fewer twists per inch.

TIPS AND TRICKS

By working from one side of the fiber bundle to the other, you will gradu-



Jude spins linen the easy way—by holding the fibers in a towel.

ally pull all the longest fibers out of the fiber supply. When you reach the wheel side, you can choose to fold the towel back to expose the next length, or you can set aside the remaining shorter fibers to recomb and use for another project. These medium to short length fibers are called the *mid'lins* and because they are also usually finer, they are often saved to make very fine high-twist lace yarns.

If you have trouble making joins, especially after the yarn has drifted apart, remember that the fibers are very long. You may need to pull a foot or more off the bobbin to find a spot to untwist and pull apart in order to get a fuzzy yarn end that will make a good join.

I usually make a sample card to record the length of each cycle, the number of treadles per cycle, the whorl size, and the numbers of yarn wraps per inch so that I can re-create the yarn later.

I usually spin linen with no more liquid than just licking my fingers as I return the drafting hand to the fiber supply to pull out the next few fibers. The size of the yarn determines how much liquid I need to make a smooth join and smooth yarn. If I need water,

I just put a small dish close by my drafting hand. I wet and smooth all my yarns when I wind the yarn from the bobbin to the skein.

To wet the yarns while I wind it into balls or onto bobbins, I simply saturate a washcloth or other piece of cloth, fold it several times until it is about three inches square, and wrap it around the thread as I am winding.

If I need a warp dressing, I use two tablespoons of linen seeds (the kind from the health food store are fine for this) dropped into boiling water, which I then let sit for about an hour. I strain the mucilaginous *goo* this process creates to remove the seeds. The warp-dressing *goo* keeps for about a week if it is sealed in a jar in the fridge, and, if needed, it can be thinned by adding a little water. I just sponge it lightly onto the top and bottom of the warp threads as they lay between the back beam and the heddles, just before I weave each section.

JUDE DAURELLE has earned the Handweaver's Guild of America Certificate in Excellence in Handspinning. She lives with her husband Dave and their three cats in Tacoma, Washington, where she teaches music in the public schools.

WARPING NOTES

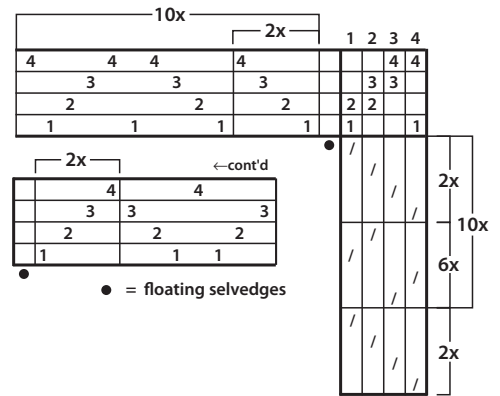
Handwoven's project instructions do not include specific warping steps in order to save magazine space for more projects and articles. For specific warping steps for the three basic warping methods, visit weavingtoday.com and click on How-To Instructions under Free Resources.

READING DRAFTS

Some drafts for weaving are very, very long if they are written out thread by thread. To save space, wherever any section of the threading or treadling is repeated, a bracket is placed above it with the number of times to thread or weave that section.

For example, in the threading draft shown at the right, there are two levels of brackets, one marked 2x and one marked 10x. To thread: Start at the right side and thread (after the floating selvedge) 1-2-3-4. Since the 2x is placed directly above these threads, you will thread that section two times. Then continue, 1-2-3-4-1-4-3-2-1-4. You are now at the end of the 10x bracket, so you'll do everything under that bracket (including the 2x section) ten times. When the threading continues to another row, you also read that row from right to left.

Repeats in the treadling and in the warp color order are treated in the same way. Note that the color order chart looks like a threading draft but indicates the order in which to wind warp colors (4 black, 8 green, 4 black, then 9 red and 9 white six times, 4 green, 4 black).



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Master Yarn Chart

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For a reference of common weaving yarns, this list includes yarns that have been used in *Handwoven* magazine projects since 2000. Numbers indicate yards per pound, meters per kilogram, and a range of setts—from wide as for lace weaves, medium as for plain weave, and close as for twills (no setts are given for yarns not suitable for use as warp). Use this chart to identify yarns and to make handspun substitutions.

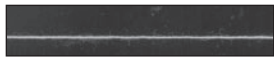
COTTON



Size 60 sewing thread; 24,000 yd/lb (48,340 m/kg); 36, 48, 60



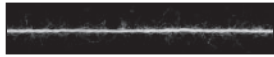
40/2 pearl cotton; 16,800 yd/lb (33,900 m/kg); 36, 48, 60



50/3 sewing thread; 14,000 yd/lb (28,250 m/kg); 36, 48, 60



30/2 unmercerized cotton; 11,055 yd/lb (22,300 m/kg); 30, 45, 54



20/2 pearl cotton; 8,400 yd/lb (16,950 m/kg); 30, 36, 48



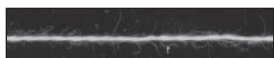
20/2 unmercerized cotton; 8,400 yd/lb (16,950 m/kg); 30, 36, 48



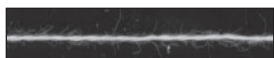
80% cotton, 20% silk (Lace Yarn) 8,100 yd/lb (16,344 m/kg) 425 yd/skein; 30, 36, 48



2-ply organic unmercerized cotton (Ecocot); 7,000 yd/lb (14,120 m/kg); 30, 32, 40



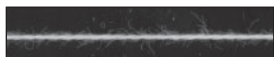
16/2 pearl cotton; 6,720 yd/lb (13,560 m/kg); 24, 30, 36



16/2 unmercerized cotton; 6,720 yd/lb (13,560 m/kg); 24, 30, 36



14/2 cotton; 5,880 yd/lb (11,865 m/kg); 24, 28, 32



12/2 pearl cotton; 5,040 yd/lb (10,170 m/kg); 20, 24, 30



100% cotton (Gima); 4,240 yd/lb (8,555 m/kg); 15, 20, 24



10/2 pearl cotton; 4,200 yd/lb (8,475 m/kg); 20, 24, 28



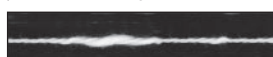
10/2 unmercerized cotton; 4,200 yd/lb (8,470 m/kg); 20, 24, 28



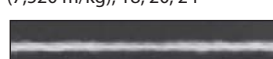
Embroidery floss (Caron Wildflower) 4,000 yd/lb (8,060 m/kg); 20, 24, 28



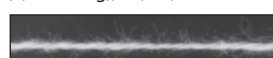
3-ply size 20 crochet cotton; 3,800 yd/lb (7,650 m/kg); 16, 20, 24



Cotton slub; 3,750 yd/lb (7,520 m/kg); 18, 20, 24



8/2 pearl cotton; 3,360 yd/lb (6,775 m/kg); 16, 20, 24



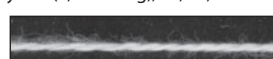
8/2 unmercerized cotton; 3,360 yd/lb (6,775 m/kg); 16, 20, 24



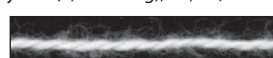
22/2 cottolin (50% cotton, 50% linen); 3,170 yd/lb (6,390 m/kg) 15, 20, 24



3-ply #10 crochet cotton; 3,050 yd/lb (6,155 m/kg); 16, 20, 24



6/2 unmercerized cotton; 2,520 yd/lb (5,080 m/kg); 14, 18, 24



5/2 pearl cotton; 2,100 yd/lb (4,238 m/kg); 12, 16, 18



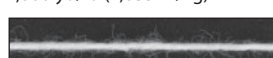
DMC Perle Cotton #5 (2-ply); 2,100 yd/lb (4,238 m/kg); 12, 16, 18



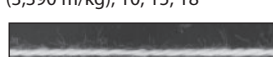
6-strand cotton embroidery floss 2,100 yd/lb (4,238 m/kg); 12, 16, 18



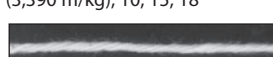
Cotton novelty (Casco Bay) 2,000 yd/lb (4,035 m/kg)



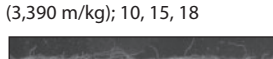
8/4 cotton carpet warp; 1,680 yd/lb (3,390 m/kg); 10, 15, 18



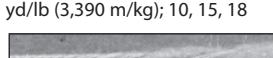
8/4 soft-twist cotton; 1,680 yd/lb (3,390 m/kg); 10, 15, 18



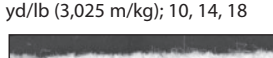
8/4 pearl cotton; 1,680 yd/lb (3,390 m/kg); 10, 15, 18



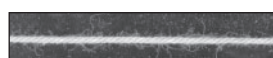
4/2 unmercerized cotton; 1,680 yd/lb (3,390 m/kg); 10, 15, 18



Cotton novelty (Snowflake); 1,500 yd/lb (3,025 m/kg); 10, 14, 18



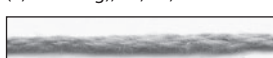
Cotton chenille; 1,450 yd/lb (2,926 m/kg); 12, 15, 18



12/6 cotton rug warp; 1,450 yd/lb (2,925 m/kg); 10, 14, 16



12/6 cotton; 1,430 yd/lb (2,925 m/kg); 10, 14, 16



100% organic cotton (Pakucho) 1,375 yd/lb (2,775 m/kg); 10, 12, 15



Cotton flake (Noho); 1,320 yd/lb (2,665 m/kg); 10, 14, 16



3/2 pearl cotton; 1,260 yd/lb (2,442 m/kg); 10, 14, 16



3/2 organic cotton; 1,260 yd/lb (2,442 m/kg); 10, 14, 16



6/2/2 cotton; 1,260 yd/lb (2,620 m/kg); 10, 12, 15



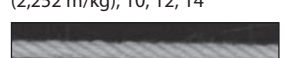
Cotton novelty (Truffles) 1,200 yd/lb (2,420 m/kg)



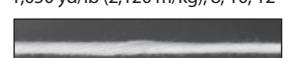
2-ply combed cotton (Monte Cristo II); 1,150 yd/lb (2,320 m/kg) 10, 12, 14



Cabled cotton; 1,116 yd/lb (2,252 m/kg); 10, 12, 14



Z-twist 4-ply cotton cord 1,050 yd/lb (2,120 m/kg); 8, 10, 12



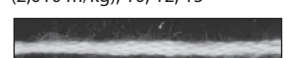
12-strand Egyptian cotton; 1,040 yd/lb (2,100 m/kg); 10, 12, 14



8-ply cotton (Nashua Natural Focus Ecologie); 1,005 yd/lb (110 yd/50 g); 6, 8, 10



Cotton bouclé; 1,000 yd/lb (2,010 m/kg); 10, 12, 15



10-ply cotton (Tahki); 980 yd/lb (1,980 m/kg); 6, 8, 10



Novelty cotton (Cathy); 950 yd/lb (1,920 m/kg); 6, 8, 10



12/9 cotton seine twine; 925 yd/lb (1,865 m/kg); 6, 8, 10



Novelty cotton (Serenity); 918 yd/lb (1,852 m/kg); 6, 8, 10



Cotton chenille; 890 yd/lb (1,796 m/kg); 6, 8, 10



Worsted-weight cotton; 850 yd/lb (1,715 m/kg); 6, 8, 10



8/8 unmercerized cotton; 840 yd/lb (1,695 m/kg); 6, 8, 10



4-ply (4/4) cotton; 840 yd/lb (1,695 m/kg); 6, 8, 10



Cabled cotton; 839 yd/lb (1,693 m/kg); 6, 8, 10



75% recycled cotton, 25% acrylic 825 yd/lb (1,664 m/kg)



4/4 cotton; 800 yd/lb (1,615 m/kg); 4, 6, 8



Worsted-weight cotton; 755 yd/lb (1,520 m/kg); 6, 8, 10



1/16" piping cord



10-ply cotton (Sand Cotton) 700 yd/lb (1,412 m/kg); 4, 6, 8



8/8/2 mop cotton; 420 yd/lb (846 m/kg); 4, 6, 8



8-ply (8/16) mop cotton 420 yd/lb (848 m/kg)



4/8 cotton (Repp Filler); 384 yd/lb (775 m/kg); 4, 6, 8



4-ply cotton cord; 260 yd/lb (525 m/kg)



Cotton string yarn (Midi) 244 yd/lb (495 m/kg)



4-ply mop cotton; 170 yd/lb (340 m/kg)



3-ply cotton rug filler 150 yd/lb (302 m/kg)



Cotton string yarn (Maxi) 123 yd/lb (250 m/kg)



8-ply mop cotton; 85 yd/lb (170 m/kg)

WOOL, ALPACA, MOHAIR, CASHMERE, YAK (QIVIUT), ETC.



Wool crepe (overtwist) 15,040 yd/lb (30,350 m/kg)



Z-twist wool crepe (overtwist) 12,000 yd/lb (24,216 m/kg)



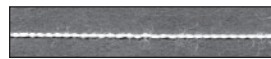
48/2 wool; 11,840 yd/lb (23,875 m/kg); 30, 40, 60



2-ply overtwisted merino wool 9,000 yd/lb (18,160 m/kg) 24, 30, 36; (56/2 TEX)



36/2 wool; 8,950 yd/lb (18,025 m/kg); 24, 36, 45



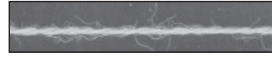
28/2 wool; 6,880 yd/lb (13,885 m/kg); 24, 36, 45



2-ply wool; 6,464 yd/lb (13,000 m/kg); 24, 28, 36



24/2 wool; 5,960 yd/lb (12,005 m/kg); 20, 24, 30



20/2 wool; 5,600 yd/lb (11,300 m/kg); 20, 24, 30



50% wool, 50% silk; 5,400 yd/lb (10,890 m/kg); 20, 25, 30



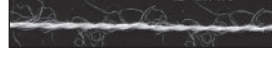
18/2 merino wool; 5,040 yd/lb (10,170 m/kg); 20, 24, 30



18/2 wool/silk; 5,040 yd/lb (10,170 m/kg); 20, 24, 30



2-ply merino wool; 4,800 yd/lb (9,685 m/kg); 16, 20, 24



2-ply wool (Mora); 4,700 yd/lb (9,467 m/kg); 16, 20, 24



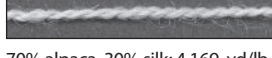
50% alpaca, 50% Tencel; 4,200 yd/lb (8,475 m/kg); 20, 24, 28



60% alpaca, 40% cotton (Serena) 4,200 yd/lb (8,475 m/kg); 20, 24, 28



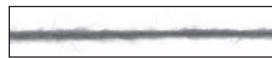
70% kid mohair, 30% silk (Kid Seta) 4,181 yd/lb (8,445 m/kg); 20, 24, 28



70% alpaca, 30% silk; 4,169 yd/lb (8,420 m/kg); 20, 24, 28



2-ply cashmere (Still River Mill) 3,657 yd/lb (7,330 m/kg); 12, 15, 18



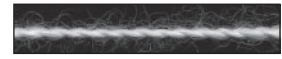
Singles wool (Pendleton); 3,600 yd/lb (7,265 m/kg); 16, 20, 24



45% cashmere, 55% silk; 3,320 yd/lb (6,700 m/kg); 15, 18, 24



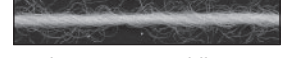
Singles wool (Fårö); 3,100 yd/lb (6,244 m/kg); 15, 18, 20



2-ply angora; 3,000 yd/lb (6,042 m/kg); 15, 18, 20



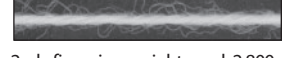
52% bamboo, 43% superwash merino, 5% silk; 3,000 yd/lb; 12, 15, 18



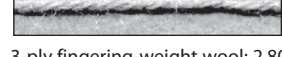
Wool roving; 2,976 yd/lb (6,000 m/kg); 12, 15, 20



100% wool (Nature Spun Fingering) 2,840 yd/lb (5,505 m/kg); 12, 16, 20



2-ply fingering-weight wool; 2,800 yd/lb (5,650 m/kg); 15, 18, 20



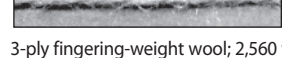
3-ply fingering-weight wool; 2,800 yd/lb (5,650 m/kg); 15, 18, 20



Handspun doubled alpaca; 2,600 yd/lb (5,212 m/kg); 12, 15, 20



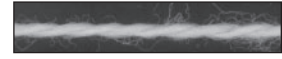
3-ply organic merino; 2,600 yd/lb (5,040 m/kg); 12, 16, 20



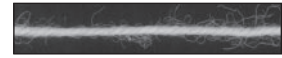
3-ply fingering-weight wool; 2,560 yd/lb (5,160 m/kg); 10, 12, 15



Singles wool; 2,240 yd/lb (4,490 m/kg); 12, 15, 20



8/2 wool; 2,240 yd/lb (4,520 m/kg); 12, 15, 20



12/3 worsted wool; 2,160 yd/lb (4,350 m/kg); 12, 15, 20



65% wool, 35% camel down 2,100 yd/lb (4,238 m/kg); 12, 15, 20



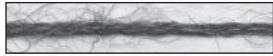
2-ply wool (Peruvian Highland) 2,112 yd/lb (4,234 m/kg); 18, 20, 24



70% wool, 30% nylon singles (Noro Kureyon Sock Yarn); 2,066 yd/lb (4,170 m/kg); 16, 20, 24



Fingering-weight superwash wool (Fortissima); 2,060 yd/lb (4,160 m/kg); 12, 15, 20



11/3 alpaca; 2,053 yd/lb (4,140 m/kg); 10, 12, 15



2-ply wool; 1,988 yd/lb (4,020 m/kg); 16, 20, 24



7/2 wool (Bockens, Borgs, or Klippans); 1,960 yd/lb (4,210 m/kg); 12, 15, 20



2-ply fingering-weight alpaca; 1,920 yd/lb (3,860 m/kg); 16, 20, 24



2-ply wool (Harrisville Shetland); 1,800 yd/lb (3,630 m/kg); 12, 15, 20



45% wool, 35% silk, 20% nylon (Silky Wool); 1,750 yd/lb (3,530 m/kg); 10, 12, 15



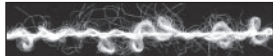
65% merino, 30% silk, 5% nylon; 1,750 yd/lb (3,532 m/kg); 10, 12, 16



7/2 wool; 1,735 yd/lb (3,500 m/kg); 10, 12, 15



90% superwash merino, 10% nylon sock yarn; 1,635 yd/lb (3,280 m/kg); 10, 15, 20



Merino bouclé; 1,635 yd/lb (3,296 m/kg); 10, 12, 15



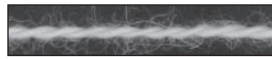
Wool singles; 1,600 yd/lb (3,210 m/kg); 10, 12, 15



6/2 wool; 1,600 yd/lb (3,225 m/kg); 8, 10, 12



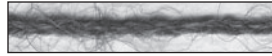
2-ply wool; 1,488 yd/lb (3,000 m/kg); 10, 12, 15



2-ply wool (50% spelsau, 50% luster); 1,488 yd/lb (3,000 m/kg); 10, 12, 15



2-ply wool; 1,475 yd/lb (2,950 m/kg); 10, 12, 15



3-ply alpaca; 1,330 yd/lb (2,680 m/kg); 8, 10, 12



50% alpaca, 50% wool; 1,315 yd/lb (2,654 m/kg); 6, 8, 10



9/4 worsted wool; 1,260 yd/lb (2,542 m/kg); 10, 12, 15



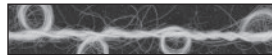
3-ply wool (Limbo); 1,234 yd/lb (2,490 m/kg); 10, 12, 15



2-ply alpaca (North Brook Farm); 1,225 yd/lb (2,455 m/kg); 10, 12, 15



3-ply alpaca (North Brook Farm); 1,175 yd/lb (2,355 m/kg); 10, 12, 15



Wool bouclé (Victorian, Halcyon Yarn); 1,175 yd/lb (2,370 m/kg); 6, 8, 10



47% rayon, 25% linen, 17% silk (Seduze); 1,150 yd/lb (2,320 m/kg); 10, 15, 20



100% wool (Nature Spun Worsted); 1,120 yd/lb (2,170 m/kg); 6, 8, 10



3-ply merino wool; 1,120 yd/lb (2,260 m/kg); 8, 10, 12



4-ply wool (Montana); 1,120 yd/lb (2,260 m/kg); 6, 8, 10



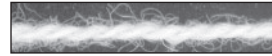
Navajo Wool Warp; 1,120 yd/lb (2,260 m/kg); 6, 8, 10



2-ply wool (Cascade 220); 1,006 yd/lb (2,060 m/kg); 10, 12, 15



2-ply wool; 1,100 yd/lb (2,240 m/kg); 6, 8, 10



2-ply wool; 1,090 yd/lb (2,200 m/kg); 10, 12, 15



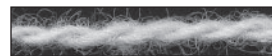
2-ply woolen-spun wool (Crown Colony); 1,040 yd/lb (2,100 m/kg); 10, 12, 15



3-ply merino wool (Gems Opal, Louet); 1,028 yd/lb (2,070 m/kg); 8, 10, 12



4-ply alpaca; 1,000 yd/lb (2,018 m/kg); 8, 10, 12



2-ply rug yarn (80% wool, 20% cotton, by Jason Collingwood); 1,000 yd/lb (2,010 m/kg); 6, 8, 10



Merino wool singles (Loft); 990 yd/lb (1,995 m/kg); 4, 6, 8



Merino bouclé; 980 yd/lb (1,975 m/kg)



4-ply 100% wool (Telemark); 941 yd/lb (103 yd/50 g ball); 6, 8, 10



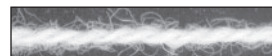
2-ply 50% buffalo, 50% alpaca (Lonesome Stone Natural Fiber Mill); 900 yd/lb (1,804 m/kg); 6, 8, 10



2-ply wool (Harrisville Highland); 900 yd/lb (1,816 m/kg); 6, 8, 10



Mohair; 900 yd/lb (1,816 m/kg); 8, 10, 12



2-ply worsted wool; 880 yd/lb (1,774 m/kg); 6, 8, 10



4-ply wool rug warp; 868 yd/lb (1,752 m/kg); 4, 8, 10



3-ply wool; 841 yd/lb (1,698 m/kg); 4, 8, 10



70% mohair, 30% wool (Lamb's Pride Handpaint Originals); 804 yd/lb (1,620 m/kg); 6, 8, 10



2-ply wool (Bartlettyarns Maine Wool); 800 yd/lb (1,605 m/kg); 6, 8, 10



4-ply sock yarn (75% wool, 25% nylon); 800 yd/lb



85% wool, 15% mohair (Lamb's Pride Worsted); 760 yd/lb (1,535 m/kg); 6, 8, 10



3-ply wool (Rugby, Wilde Yarns); 720 yd/lb (1,450 m/kg); 6, 8, 10



4-ply wool (Lincoln Longwool); 700 yd/lb (1,752 m/kg); 4, 8, 10



Persian rug wool (Paternayan); 672 yd/lb (1,356 m/kg); 4, 6, 8



Wool singles (Manos del Uruguay); 630 yd/lb (1,270 m/kg); 6, 8, 10



85% wool, 15% alpaca singles (Berkshire); 643 yd/lb (1,300 m/kg); 4, 6, 8



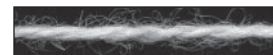
Wool singles (Wool Classica); 631 yd/lb (1,300 m/kg); 8, 10, 12



3-ply rug wool; 578 yd/lb (1,160 m/kg); 6, 8, 10



85% wool, 15% mohair (Lamb's Pride Bulky); 570 yd/lb (1,150 m/kg); 4, 6, 8



2.2/2 rug wool; 550 yd/lb (1,110 m/kg); 8, 10, 12



Wool singles (Iceland); 495 yd/lb (998 m/kg); 4, 6, 8



2-ply rug wool; 480 yd/lb (970 m/kg)



Wool singles (Geo, Halcyon) 470 yd/lb (948 m/kg)



3-ply rug wool (Deco); 460 yd/lb (926 m/kg); 4, 6, 8



3-ply wool rug yarn; 260 yd/lb (525 m/kg); 2, 4, 5



18/3 rug wool; 330 yd/lb (665 m/kg)



Merino wool (Tahki Baby Yarn) 274 yd/lb (552 m/kg); 2, 4, 6



3-ply rug wool; 260 yd/lb (525 m/kg)



Wool/alpaca blend (Blue Sky Bulky) 205 yd/lb (45 yd/100 g)



95% wool, 5% acrylic (Circus, Artful Yarns); 93 yd/100 g

SILK AND SILK BLENDS



140/2 silk; 35,000 yd/lb (70,630 m/kg); 56, 72, 90



Undegummed silk; 15,000 yd/lb (30,270 m/kg); 40, 45, 60



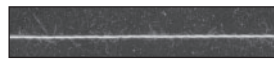
60/2 silk; 14,880 yd/lb (30,028 m/kg); 40, 45, 60



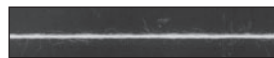
Silk elastic (use with other warp yarns only); 13,600 yd/lb (27,445 m/kg)



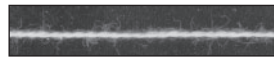
4-strand unspun silk 10,000 yd/lb (20,180 m/kg)



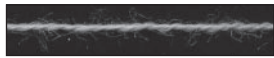
20/1 silk (70% silk, stainless steel core); 9,600 yd/lb (18,600 m/kg) 12, 24, 40



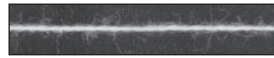
140/2/4 silk; 7,950 yd/lb (16,050 m/kg); 24, 32, 40



30/2 silk; 7,850 yd/lb (15,840 m/kg); 24, 32, 40



30/2 muga (wild) silk; 6,800 yd/lb (13,720 m/kg); 24, 32, 40



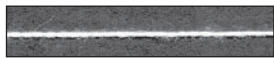
#73 fine silk cord; 7,850 yd/lb (15,840 m/kg); 24, 32, 40



30/2 silk fris e boucl e; 7,440 yd/lb (15,010 m/kg); 24, 32, 40



70% silk, 30% Seacell (Sea Silk) 7,440 yd/lb (15,010 m/kg); 24, 32, 40



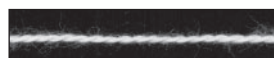
120/8 tussah silk; 6,100 yd/lb (12,225 m/kg); 24, 30, 36



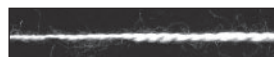
50% wool, 50% silk; 5,400 yd/lb (10,890 m/kg); 20, 25, 30



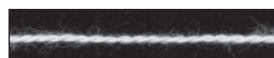
18/2 wool/silk; 5,040 yd/lb (10,170 m/kg); 22, 26, 30



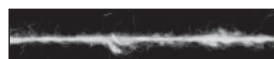
20/2 spun silk; 5,000 yd/lb (10,100 m/kg); 22, 26, 30



Uneven spun silk; 4,960 yd/lb (10,000 m/kg); 22, 26, 30



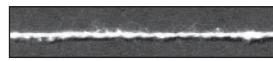
20/2 silk; 4,900 yd/lb (9,880 m/kg); 22, 26, 30



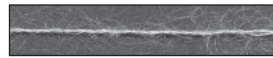
10/1 silk noil; 4,800 yd/lb (9,686 m/kg); 22, 26, 30



#6 fine silk cord; 4,650 yd/lb (9,380 m/kg); 22, 26, 30



20/2 noil bombyx silk; 4,500 yd/lb (9,020 m/kg); 22, 26, 30



70% kid mohair, 30% silk (Kid Seta) 4,181 yd/lb (8,445 m/kg); 20, 24, 28



70% alpaca, 30% silk; 4,169 yd/lb (8,420 m/kg); 20, 24, 28



15/2 tussah silk; 3,759 yd/lb (7,600 m/kg); 18, 20, 22



8-strand silk cord; 3,750 yd/lb (7,565 m/kg); 18, 20, 22



45% cashmere, 55% silk; 3,320 yd/lb (6,700 m/kg); 15, 18, 24



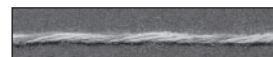
Fine silk cord; 3,100 yd/lb (6,250 m/kg); 15, 18, 20



6/1 mawata silk novelty; 2,960 yd/lb (5,967 m/kg); 10, 12, 15



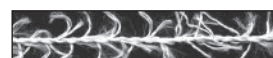
12/2 spun silk; 2,900 yd/lb (5,850 m/kg); 15, 18, 20



4-ply 75% rayon, 25% silk (Splash!) 2,800 yd/lb (5,650 m/kg); 15, 20, 24



100% silk floss (Alec Jackson Premium Japanese Silk Floss)



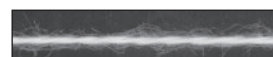
Silk fris e eyelash; 2,970 yd/lb (6,000 m/kg)



12/2 spun silk; 2,900 yd/lb (5,850 m/kg); 15, 18, 20



8/2 silk; 2,800 yd/lb (5,650 m/kg); 14, 18, 22



2-ply silk cord; 2,800 yd/lb (5,650 m/kg); 14, 18, 22



2-ply silk noil; 2,700 yd/lb (5,450 m/kg); 12, 15, 18



Viscose Sizing Fancy Silk; 2,480 yd/lb (5,000 m/kg); 12, 15, 18



2-ply Cascade silk; 2,000 yd/lb (4,040 m/kg); 12, 16, 18



45% wool, 35% silk, 20% nylon (Silky Wool); 1,750 yd/lb (3,530 m/kg); 10, 12, 15



65% merino, 30% silk, 5% nylon 1,750 yd/lb (3,532 m/kg); 10, 12, 16



70% merino, 30% silk (Silk Blend) 1,370 yd/lb (2,780 m/kg)



12-ply silk; 1,100 yd/lb (2,220 m/kg); 10, 14, 18



Recycled silk (Mango Moon) 400 yd/lb (782 m/kg)



Recycled silk knitting yarn (Himalaya) 80 yd (74 m)/hank



10-strand silk embroidery floss (Waterlilies, Caron)

LINEN



50/1 linen; 15,000 yd/lb (30,270 m/kg); 30, 40, 48



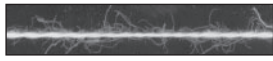
2-ply line linen (Linen 14); 7,000 yd/lb (14,030 m/kg); 24, 30, 36



48/2 line linen; 7,000 yd/lb (14,120 m/kg); 30, 32, 36



40/2 linen; 6,000 yd/lb (12,108 m/kg); 24, 30, 36



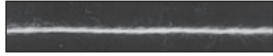
12/2 cot/lin (70% cotton, 30% linen)
5,040 yd/lb (10,170 m/kg); 20, 24, 30



16/1 linen; 4,800 yd/lb
(9,686 m/kg); 20, 24, 28



30/2 linen; 4,500 yd/lb
(9,075 m/kg); 20, 24, 28



28/2 linen; 4,200 yd/lb
(8,475 m/kg); 20, 24, 28



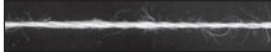
22/2 cottolin (50% cotton, 50% linen
or 60% cotton, 40% linen); 3,170–3,300
yd/lb (6,390 m/kg); 15, 20, 24



20/2 linen; 3,000 yd/lb
(6,050 m/kg); 15, 20, 24



16/2 linen; 2,400 yd/lb
(4,840 m/kg); 15, 20, 24



14/2 linen; 2,450 yd/lb
(4,750 m/kg); 14, 18, 22



49% linen, 35% kid mohair,
16% nylon (KidLin); 2,270 yd/lb
(4,550 m/kg); 10, 12, 18



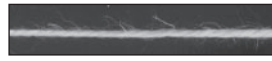
Singles tow linen; 2,064 yd/lb
(4,150 m/kg); 12, 16, 20



48/2/4 line linen; 1,750 yd/lb
(3,530 m/kg); 12, 16, 20



10/2 wet-spun linen; 1,600 yd/lb
(3,228 m/kg); 12, 15, 18



10/2 linen; 1,500 yd/lb
(3,025 m/kg); 12, 15, 18



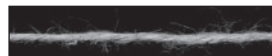
30% linen, 70% organic cotton (Allegoro)
1,400 yd/lb (2,825 m/kg); 10, 12, 15



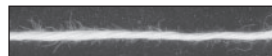
4-ply linen (Euroflax); 1,300 yd/lb
(2,625 m/kg); 10, 14, 18



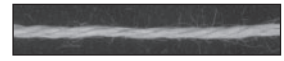
8/2 linen; 1,200 yd/lb
(2,420 m/kg); 10, 14, 16



16/4 linen; 1,200 yd/lb
(2,420 m/kg); 10, 14, 18



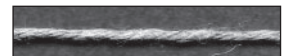
4-ply wet-spun linen; 1,200 yd/lb
(2,420 m/kg); 10, 14, 18



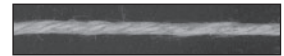
8/3 linen; 800 yd/lb
(1,614 m/kg); 8, 10, 12



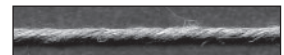
10/5 linen; 600 yd/lb
(1,210 m/kg); 8, 10, 12



8/4 wet-spun linen; 600 yd/lb
(1,210 m/kg); 8, 10, 12



8/5 linen; 480 yd/lb (968 m/kg)
6, 8, 10



8/6 wet-spun linen; 400 yd/lb
(810 m/kg); 6, 8, 10