

[The Magic of Silk... at What Cost?](#)

Category : [January/February/March 2010](#)

Published by dharmalingam on Dec. 27, 2009

The Magic of Silk... At What Cost?

The Innocence of Insect Husbandry Is Questioned

Who can deny the beauty of a well woven piece of silk fabric or the intricately embroidered designs that skilled hands have created from silk thread, each triangular fiber refracting the light to produce a natural shimmer? Or the fact that silk garments are uniquely cool in warm weather, yet provide insulation in the cold? And what about silk clothing's venerable place in Asian culture? Doesn't every Indian bride dream of a silken sari? The sheer magic of its production from the insect realm to fabric is fascinating. For most of us, silk is appealing if not enthralling.

There's another side of silk, though, one which people concerned about upholding the principle of ahimsa (nonviolence) must consider: All the wondrous qualities of silk come at the price of literally billions of silkworms, all of whom are raised and killed in order to harvest their valuable cocoons.

For people trying to live as compassionate a life as possible, there are alternatives. So-called "ahimsa silk" or "peace silk" is made only from cocoons discarded after the moth has naturally emerged. It is marketed and sold by a small number of companies and is an option which some Hindus may find acceptable. Even here though, doubts are justly raised about whether such silk should be called "nonviolent."

Animal rights groups recommend synthetic fibers as a more compassionate option over all silks. But synthetic textiles are produced from chemicals and petroleum derivatives; so--given all that we now know about fossil fuels' role in both global climate change and environmental pollution--are synthetic fibers really any less

violent?

History

Silk farming, called sericulture, is nearly as old as human civilization itself. Tradition says that the fourteen-year-old Chinese queen Hsi-Ling-Shih observed the remarkable fast growth of silkworms in the wild and brought a cocoon back to the palace. One day she accidentally dropped a discard cocoon into her tea. When she removed it, the cocoon began unravelling and the idea for silk fabric blossomed.

Archeological evidence for the antiquity of silk production winds back to this same era. In modern Shanxi province, a silk cocoon, cut in half by a knife and dated to 3000-5000 BCE, has been discovered. The moth species was *Bombyx mori*, the one used in most silk production today.

Across the Himalayas, use of silk in India also dates back to antiquity. References in the Rig Veda and Mahabharata refer to silk fabric being used for clothing, while the Ramayana mentions Sita's receiving silken vestments as gifts.

Archeologists have discovered wild silk threads at Harappa and Chanhu-daro dating back to 2450-2000 bce. The species used in the production of the threads were *Antheraea mylitta* (the modern day Tussar silk moth) and the Eri silk moth. It is presumed their cocoons were collected from the wild. The Chinese considered silk production a state secret, a breach of which carried the death penalty. But around 550 ce, live cocoons were smuggled into Central Asia. The Arabs brought sericulture to Africa and Europe 100 years later. By 1450, the silk industry was booming in Europe. Later the European industry declined and the center of the silk cultivation shifted back to the Orient, with China in the lead today. (See our timeline.)

Today silk production accounts for less than 0.2% of total global textile output, a mere 3 ounces of silk for every 100 pounds of cloth. Though production is spread out over 60 countries, 90% comes from Asia and about 70% from China, where the industry employs one million people. Second-place producer India employs 700,000 households. The largest silk importing and consuming nation is India, where the majority of silk is woven into saris.

Conventional Silk Production

The dominant species used in sericulture is today, as it was thousands of years ago, *Bombyx mori*. Though once a wild animal (*Bombyx mandarina* is suspected to be the ancestor of the domesticated *Bombyx mori*), at this point it is entirely a domesticated species, blind and incapable of flight.

The silk production process begins with tiny eggs, laid by the few female silk moths that have been allowed to emerge from their cocoons. Each lays between 200-500 eggs.

In about seven days, the eggs hatch into 3mm-long larva. For several weeks the larva are fed around the clock on chopped mulberry leaves during which time they molt several times and grow to about 9cm in length. Over this period the silkworm increases in weight about 10,000 times.

When they are ready to spin their cocoons, the worms are transferred to a fresh set of bamboo trays. Silkworms possess a pair of specially modified salivary glands called sericteries, which are used for the production of a clear, viscous, proteinaceous fluid that is forced through openings called spinnerets on the mouthpart of the larva. As the fluid comes into contact with the air, it hardens into thread which the worm uses to spin the cocoon. The diameter of the spinneret determines the thickness of the thread, which emerges as a long, continuous filament.

After several days in the cocoon, it is harvest time. To unravel the thread as one single strand, the cocoon must be harvested before the pupa matures and emerges as a moth. If the moth naturally emerges from the cocoon, it cuts the filament, just as you might take a pair of scissors and cut up a ball of yarn.

To prevent this, the pupae are killed by a process euphemistically called "stifling." This is generally done by boiling, steaming or baking. If water or steam is used, the cocoon must be worked immediately; otherwise, the pupae inside will putrify during storage and contaminate the filament. If baked and dried, the cocoons can be stored for later use.

Once this is done, the end of the silk thread is located and the entire cocoon unwound, either mechanically or by hand. Each cocoon produces 600 to 900 meters of filament. Five to eight filaments are reeled together to make a single thread for textile production.

By some accounts, 50,000 cocoons are required to make one silk sari. And to feed those silkworms requires a ton and a half of fresh mulberry leaves.

Wild Silk Production

Bombyx mori may be the dominant silkworm, but it is not the only species used in textile production. *Antheraea pernyi*, *Antheraea mylitta* and *Antheraea yamamai* are used to make tussah or tassar silk (in China, India, and Japan, respectively); *Philosamia cynthia* and *Philosamia ricini* are used to make eri silk. *Antheraea assama* produces a golden yellow colored silk, known as muga. India is the only nation in the world that produces all three of these varieties. Collectively, these are known as wild silks, though semi-domesticated might be a better term. India produces over 1,500 metric tons of wild silk annually.

The main difference between wild silk and domestic silk is where the eggs are laid and cocoons are formed. Tussah and muga silk moths are allowed to breed, lay eggs, and the larva then feed on leaves in trees and form cocoons which are later removed. This eliminates the tedious feeding and management of larva in baskets indoors. In most cases, the cocoons are then "stifled" in the same way as cocoons raised in feeding barns.

What Is Ahimsa Silk?

Ahimsa silk is different. To produce this silk, cocoons are collected after the moths have emerged. Most of this silk comes from the semi-domesticated silkworm species, but *Bombyx mori* can be used as well.

A number of online and brick-and-mortar stores sell finished ahimsa silk, but there are two main US outlets for this fabric: Aurora Silk (www.aurorasilk.com) based in Portland, Oregon, and run by Cheryl Kolander; and Ahimsa Silk (

www.ahimsasilk.com), based in Pune, India, and run by Leelavati Sabale. The latter firm is endorsed by People for Animal's Maneka Gandhi and proudly displays a testimonial from HH The Dalai Lama on its website.

Aurora Silk markets both Bombyx mori-based ahimsa silk (in fact, Kolander's partner in India has the trademark on the name "Ahimsa silk" made from Bombyx mori in India), as well as silks described as "peace silk" made from tussah, eri and muga cocoons. Kolander emphasizes that all her silks are produced and hand-woven by rural villagers, providing them with much-needed income.

Ahimsa Silk sells a range of fabrics for fashion and furniture, including a line of shawls, scarves and stoles. All are made from cocoons naturally discarded by emerging silk moths, who live through the process. This silk is sourced from northeast India in the case of eri and muga, while tussah is produced in central India and Uttaranchal. Ahimsa Silk emphasizes the fact that it works together with People for Animals in training villagers so they can produce this sort of silk, which commands a price premium over conventionally produced silk.

It should be noted that ahimsa silk producers are doing their best to provide assurances that their products do not involve violence to the silk moth or larva. But there is no certification scheme to reference, as there is with organic produce, for example. So for the consumer, it is a matter of trust.

Questions about Ahimsa Silk

Search for "ahimsa silk" on the internet and you can't help but notice that near the top of the results is an article titled "Ahimsa (Peace) Silk: Why I Think It Doesn't Add Up" by Michael Cook, who raises silkworms and works in silk in Texas. Cook's main problems with ahimsa silk are: First, where do you draw the line with violence? He points out that if you actually let all the female moths lay eggs, you have so many excess larvae on your hands that you can't feed them all and some end up dying.

As Cook articulated to Hinduism Today, "It's a question of whether it's volitional or accidental, whether they are dying through neglect or dying through your action;...letting them breed and lay eggs that hatch and then starve or desiccate to death, I don't find that significantly different than killing them by choice."

His other gripe is about terminology: If you see ahimsa silk marketed as "wildcrafted," implying that the cocoons have all been gathered from the wild, that's simply not the case, Cook asserts. That may have been true twenty years ago, but not in 2009. "It's like talking about bison that roam freely on the prairies unfenced, and then implying that the bison meat you buy at Whole Foods is free range, when actually it is ranched."

This sort of terminology can get out of hand quickly: Cheryl Kolander has heard back from customers that they have seen Chinese silk being sold in New York City, claiming to be produced non-violently and even presented with counterfeit versions of Aurora Silk labels. Cook speaks of seeing tussar silk being marketed as inherently peace silk because, he paraphrases, "It's harvested from the jungles after the moths have emerged from the cocoons," when in reality those moths were raised specifically for silk. Just because a silk is not *Bombyx mori* doesn't mean it is ahimsa silk. Further discrepancies between description and reality can occur: Animal rights group Beauty Without Cruelty has publicly accused one silk producer in South India of promoting silk as ahimsa silk when the process they witnessed was just a twist on conventional silk production. Beauty Without Cruelty says they did see cocoons from which the moths were allowed to emerge, but what happened afterwards to the moths called the ahimsa description into question.

"After emerging, the male and female moths are kept together for three hours to mate. The females are then segregated and placed in trays to lay eggs. The males are put in a refrigerator, kept semi-frozen, and trotted out repeatedly to mate. They are eventually thrown into a dustbin to die lingering deaths when their virility diminishes."

Ultimately, Beauty Without Cruelty concludes, based on this expedition, that no silk can truly be called ahimsa silk "unless it is artificially made of yarns such as polyester."

But such a position just opens more questions about pollution caused by oil-based fabrics and the very act of farming itself. Where and by what criteria do we draw the line between violent and nonviolent action?

The Making of Silk

The domesticated female *Bombyx mori* moth, whose offspring produce over 90% of the world's silk, cannot fly, never sees the light of day, is bred, lays eggs once then dies. Her larval offspring are pricked, boiled or baked to death in their cocoons before they mature. The raw silk strands unraveled from these cocoons eventually becomes the silk you wear. The process is 5,000 years old, if not older. Today one can find silk being made on a small scale, such as in Thailand villages, and mass-produced on huge silkworm farms and factories that process hundreds of thousands of cocoons each month, such as in China. At the top of silk's consumption ladder are Indian Hindus who buy silk saris. Increasingly, however, Indian ladies with compassionate hearts are calling for an end to silk.

1. The female silk moth is raised and bred. She lays her eggs inside an enclosure and then dies.
2. The freshly hatched larvae are barely 3mm long.
3. Also called silkworms, they are placed in baskets of mulberry leaves. Baskets are kept in an exceptionally clean environment.
4. Workers may not smoke, make noise, eat garlic or chicory or do anything to upset the sensitive larvae, who eat voraciously.
5. As they grow and make waste in one basket, they are moved by hand to clean baskets with fresh leaves. Heads down, they eat continuously for about 20 days and grow to be about 9 cm long.
6. After about 22 days, they stop eating and raise their heads, signaling their readiness to spin cocoons.
7. Workers carefully place the worms in specially designed baskets with compartments that keep the cocoons separate and uniform.
8. From a pair of modified salivary glands, the worms secrete a viscous fluid that hardens into a filament on contact with air.
9. Spinning round and round in a figure eight, they cocoon themselves with a single filament that will ultimately be 600 to 1000 meters long.
10. The silkworms spin for three or four days, then stop and turn into pupae to begin the magical transformation into moths.
11. To prevent them from emerging and thus damaging the cocoons, the pupae are pricked to death, boiled or baked alive inside the cocoons.
12. Skilled hands find the ends of the single filament of individual cocoons, twist them together to form a single thread and pass it to a reel.
13. The diameter of the thread depends on how many filaments are twisted and reeled together.
14. Floated in hot water to loosen the viscous filament, cocoons unroll as the filament is reeled up. Shown here is a fine-grade, five-strand thread.
15. Workers stop the reeling when a single cocoon is finished, find the end of another cocoon's filament, attach it to the thread and resume reeling.

16. The silk thread is then hung and readied for bleaching, dying and weaving.

Hindus Comment on the Use of Silk

Kannan Srikanth, Hyderabad: Though apparently there are some esoteric reasons for wearing silk, it is generally considered himsa. The Kanchi Shankaracharyas have for more than three decades deplored the use of silk, even counseling their followers to not purchase silk sarees for weddings but only cotton saris and dhotis. They especially counsel that at least the holy clothes in which the couple get married in front of the homa fire should be fully ahimsa and made of cotton, not silk.

Dr. Nandita Shah, Sharan, Mumbai: There is absolutely no link between silk and ahimsa. Anyone who has seen the process by which silk is made cannot say silk does not involve a lot of violence, albeit to tiny creatures. www.sharan-india.org

Ravi Grover, Illinois: We don't need silk saris or silk fabrics, because science is advanced enough to have created quality cloth from non-animal sources. If we didn't have access to plants or synthetic fibers (like people in Alaska or some other remote location), then it would be necessary to use animals. But since most of us aren't in that situation, there's no necessity for silk

Hinduism asks us to live simply. An excessive lifestyle is what has led most people to go into debt, lose their homes to foreclosure and have troubles paying their bills. Silk is a more expensive fabric and encourages people to focus on acquiring unnecessary material possessions rather than seeking spiritual progress or living simply with a lower carbon footprint.

I would like to share with you this quote from the PETA.org site:

"To obtain silk, distributors boil the worms alive inside their cocoons. Anyone who has ever seen worms startle when their dark homes are uncovered must acknowledge that worms are sensate--they produce endorphins and have a physical response to pain."

We have humane alternatives to silk--including nylon, milkweed, seed pod fibers, silk-cotton tree and ceiba tree filaments, polyester, and rayon. These are easy to find and usually less expensive than silk. Please search the web for "cruelty to insects" for details.

Timeline: 6500 bce to 2007 ce

- 6,500 bce Silk is mentioned in the Rig Veda.
- 5000-3000 bce Silk fabric production is established in China. It is decreed a state secret, with disclosure punishable by death.
- 2450 bce Wild silk is used for thread in the Indus/Saraswati civilization. Mentioned in the Ramayana
- 2000 bce Silk trade starts between East Asia and Western Asia
- 1070 bce Silk is traded as far as Egypt, as evidenced by a silk thread in the hair of a mummy in the Valley of the Kings.
- 30 bce Roman trade with Asia expands. So much silk enters Rome that the Senate tries to prohibit its wearing. It was seen as a sign of decadence, plus the trade was draining Roman coffers.
- 200 Silk Road trade is established. Sericulture spreads to Japan. Sericulture, using domestic silkworms, spreads to India.
- 552 Byzantine emperor Justinian obtains silkworm eggs, smuggled back from Central Asia in bamboo rods. Byzantine church begins making silk fabric.
- 1200 Italy develops a large domestic silk industry as skilled weavers flee Constantinople after the Fourth Crusade. Silk production flourishes in India, from Kashmir to Mysore.
- ca 1450-1475 Italy