

Silk and Silkworms
Dr. Marian Goldsmith, Professor, URI
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Summary by Emily Huber

Silk is one of the most expensive fibers. Due to its cost and the tedious production process, it is considered a luxury textile. A presentation by Professor Marian Goldsmith, a biologist, divulged the details of silk worms and silk production. She began the presentation with a brief history of silk production. Silk originated in China in the year 4900 B.C. According to myth and legend, princess Hsi-Ling-Shih discovered silk fiber when a cocoon fell into her cup of tea and began to unravel. For 3,000 years silk production was considered a national secret, at pain of death if exposed. Eventually, the trade spread along the Silk Road. Sericulture developed in Japan, Korea, and India. The “secret” spread to Constantinople, and then Europe.

There are many types of silkworms, some of which were naturally selected and some of which were bred for specific traits. The most common domesticated silkworm is the *bombyx mori*. Silk produced by wild silk worms is referred to as “Tussar” or “Eri” silk. The cocoons are procured in nature, rather than in a factory, a laboratory, or a farm. What makes the *bombyx mori* unique is that the adult moth cannot fly. This makes the breeding process easier as they are generally sedative and are less likely to escape.

The life cycle for the *bombyx mori* begins with the mating process. The moth then lays eggs. The *bombyx mori* produces significantly more eggs than wild variations due to human selection. The eggs hatch in 10 days, becoming larvae. The larvae are the worm-like critters that spin cocoons. They go through a 4-stage molting process called the metamorphosis. Once they construct their cocoons they turn from larvae to chrysalis or pupa. It takes two weeks for the chrysalis to develop into an adult moth. When they are ready to hatch, the bugs excrete an enzyme that breaks down the walls of their cocoon and they force themselves out. When they spread their wings, they are full, adult moths.

The process for silk production interrupts the life cycle at the cocoon phase. Silkworms produce their cocoons with silk threads. These threads are composed of sericin and fibroin proteins, which are produced in the silk gland and ejected through a spinneret at the larvae’s head. One thread is selected from the cocoon and it is unraveled to create strands of silk fiber. There is a 4-step process for silk production. The first step is to dry the cocoons. The second step is to degum the silk, which involves removing the layer of sericin. The amount of degumming that takes place will define the quality of the silk such as the absorbency and feel, also known as “scroop.” The silk is then reeled and thrown to create spools of silk thread. These are known as “hanks.”

One important factor to silk production is the cultivation of mulberry trees as food for the silkworm. The silkworm eats exclusively mulberry leaves. The nutrients in the tree are vital to the survival of the silkworm. If one is to practice sericulture, then one must also procure mulberry trees. In order to produce a 60kg bale of raw silk, one would need 45 acres of mulberry trees to feed the silkworms. Yet, 12kg of raw silk would produce around 27 kimonos. A great deal goes into the production of silk, which is why it remains one of the most luxurious and expensive textiles on the market.

