



The cocoon treasure: Mulberry silk worm (*Bombyx mori*)



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It is quite fascinating how some of the finest things in life have their origins in the humblest of situations. Power and royalty have throughout history been revered and nothing has brought out this better than adornments. Top on the ranking of favoured fabrics is silk; a unique fibre naturally produced by the larval stages (silkworms) of the silkmoth species¹.

In Africa, the commonly occurring silkworm species is the *Bombyx mori*. This species belongs to the Class; Insecta, Order: Lepidoptera, family: Bombycidae, genus: Bombyx. The Latin species name *Bombyx mori* means silkworm of the mulberry tree. A name that characteristically defines this worm species as it feeds mainly on the mulberry tree leaves during one of its critical lifecycles. This particular species is the best producing silkworm and due to centuries of domestication, this species is no longer found in the wild and has even lost its natural instinct to fend for itself in the wild².

This silkworm has a four stage lifecycle (Figure 1). The *Bombyx mori* life cycle goes through the egg-larva-cocoon and moth stages.

Egg:

The female moth has the ability to lay over 400 eggs which hatch after ten days to larvae. The eggs often turn from lemon-yellow (Figure 2) color to black before hatching¹.



Figure 1: Lifecycle of the *Bombyx mori*

Larvae:

The larval stage (Figure 3) takes between 32-38 days (www.encyclopedia.com). During this stage the larvae undergoes four successive molts with cumulative five growth instars. The larvae feed ferociously on the mulberry leaves and most growth spurts are observed during this period. The larvae have a preferred taste for the mulberry tree due to the mulberry odorant (cis-jasmone)¹. By the end of the larval stage, the worms are about 3 inches long². The silkworms moult (shedding of skin) 4 times before they mature to pupae encased in well-spun cocoons.

Pupae:

During this stage, the larvae stop feeding and attached themselves to any substrate, in a slow and circular motion, the larvae, spins a cocoon². These well-spun cocoons are white in colour (Figure 4) and made from a moist substance known as fibroin, produced from the spinneret.

Adult:

The adult silkworm is dusty brown in colour, but because they are degenerated, the adults are flightless. The moths emerge after two weeks in the cocoon. They also lack functional mouth parts. The adults are distinguished by the large abdomen and large antennae found in females and males respectively. Mating often occurs after 24 hours after hatching.

Economic importance of silkworms:

Sericulture:

Silkworm farming (sericulture) has over centuries been practiced extensively in Asia and China but has since gained ground in Africa such as Madagascar, South Africa, Botswana, Egypt, Nigeria, Ghana, Ethiopia, Rwanda Kenya and Zimbabwe. In most of these countries, sericulture has been associated with women self-help groups or organizations. Some of these African countries have have invested further in infrastructure to spin the raw silk yarn eg. Ethiopia, Kenya, Rwanda³.

In Africa, Most silkworms are reared on beds. These beds are often made of wooden casings with a mesh bottom (Figure 5).

Farmers often provide the growing larvae with adequate feeds to the 5th moult after which the silkworms stop eating and are ready to start spinning their cocoons ready for pupation. It is at this stage that the farmers often transfer them to specially woven mats (Figure 6) with small rows to allow them to attach and start spinning their cocoon.



Figure 2: Newly laid eggs and female of the mulberry Silkworm (<https://www.pinterest.com/jcmarvin4rescue/sericulture/>)



Figure 3: 4th instar larval stages of the *Bombyx mori* (<https://simple.wikipedia.org/wiki/Silkworm>)

has been associated with women self-help



Figure 4: Silkworm cocoons



Figure 5: Female farmer rearing silkworms (africajumpstart.com)

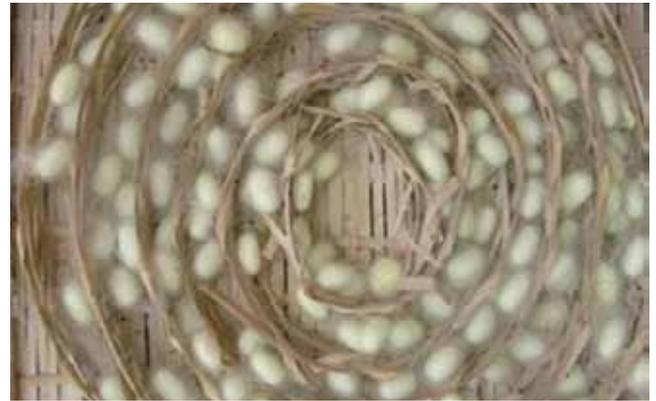


Figure 6: Woven mats used for pupation of larvae in sericulture

The silk worm cocoon is the most important lifecycle of the silkworm's lifespan, this cocoon is made up of one thread of raw silk than can spun approximately 300-900metres long⁴. It would require 3,000 cocoons can produce 0.4kg of silk². The cocoons are often immersed in hot water to kill the pupae within the cocoon so as to prevent the breaking of the thread upon emergence as well as soften the secretin which holds the silk threads together³.

It is important to note that silkworms diets also affect silk production. It has been documented that worms fed on wilted mulberry leaves or native plants produce silk of low quality⁶. Through advancing research, fluorescent dyes are introduced in feeds and ingested resulting in colored cocoons (Figure 7) as well as the development of genetically modified silkworms, this is a technique yet to be introduced into Africa but has great potential⁶.



Figure 6: Woven mats used for pupation of larvae in sericulture



Figure 8: Boiled Silk worm pupae pitted on wooden sticks as a snack (<http://gbtimes.com/lifelikes-there-are-silkworms-my-plate>)

Source of food:

The silkworm pupae are also used as a source of food but mainly in the Asian countries such as china, Korea and Japan. They are a rich source of protein, fiber, and some vitamins and minerals. This delicacy (Figure 8) is considered very environmental friendly as insects leave no carbon print.

Diseases:

The mulberry silkworm diseases are often viral, bacterial, Fungal and protozoan. These diseases are often triggered by poor management practices.

Way forward

Africa should tap into capitalizing on this animal resource and work towards increasing its productivity. Silkworm farming is an easy agribusiness model for Africa and the continent needs to work towards

using this natural silkworm resource to spin more money.

References

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