

## Guide Walk (Oct.13, 2021) – Notes by Erin D., Gardener

***Morus alba*** ‘Unryu’ (Contorted Mulberry, White Mulberry) (Family Moraceae) (Accession number 1990-0600)

- ‘Unryu’, meaning “twisted” or “contorted” in Japanese, is a cultivar of the White Mulberry, with gnarled, contorted, zigzag branching. Catkins appear in spring, followed by white, pink or darker fruits (mulberries) in summer; glossy green leaves turn yellow in autumn (glossiness of leaves distinguishing *M. alba* from *M. rubra* and *M. nigra*); and contorted branching gives winter interest. They are usually dioecious (Male and female flowers on separate plants, but can sometimes be monoecious).
- *Morus alba* was so named because the first specimens named by European taxonomists were a mutation with white fruit. Wild trees bear black fruit like other mulberries.
- *Morus alba* is native to central China but has been widely cultivated and naturalized through India, Iran, Turkey, Kyrgyzstan, Europe, South Africa, Australia, Mexico, the United States, and Argentina, and is considered an invasive species in Brazil.
- *Morus alba* is known for the fastest movement in the plant kingdom with pollen being dispersed at 610Km/hr, or half the speed of sound, by stamens that act like catapults.

### Uses

- Fruit – eaten, often dried, or made into wine
- Tea – mulberry leaf tea (Pongnip-cha) in Korea
- Traditional Chinese Medicine – lower cholesterol, obesity and stress
- Dyes
- Feedstock – preferred feedstock for silkworms, but also cut for food for livestock (cattle, goats) in areas where dry seasons restrict availability of ground vegetation
- Wood – Used to make musical instruments such as tar and setar in Iran
- Paper – Early Chinese papermaking combined mulberry bark, hemp and rags with water to make a pulp which could be pressed and dried.

### Sericulture

- *Morus alba* is the preferred diet of silkworms, used in their cultivation since at least 2600 BC in China, possibly earlier. According to Confucian texts, the discovery of sericulture dates back to about 2700 BC. In 1977, a piece of ceramic dating to about 3400-3500 BC was found in China that was designed to look like a silkworm. Silk fibre dating back to 2400-2000 BC was found in Indus civilization sites. By 140 AD sericulture was well established on the Indian subcontinent.
- By the first half of the 1<sup>st</sup> century AD, the Silk Road had brought sericulture and mulberry groves to ancient Khotan, a Buddhist Persian kingdom (located in Western Xinjiang, west of modern day Hotan) built on an oasis on the edge of the Taklamakan Desert. It was a center for production and export of silk and carpets, as well as nephrite jade and pottery.
- In the 6<sup>th</sup> century AD, the smuggling of silkworm eggs into the Byzantine Empire led to its establishment in the Mediterranean and it remained a monopoly in the Byzantine Empire for centuries (Byzantine Silk).
- In 1147, during the Second Crusade, Roger II of Sicily attacked Corinth and Thebes (important centers of Byzantine silk production), capturing weavers and their equipment and then proceeded to establish his own silkworks in Palermo and Calabria. The industry eventually spread to Western Europe.
- *Morus alba* has been grown widely for the last 1000 years to feed silkworms, from the Indian subcontinent, west through Afghanistan and Iran to Southern Europe.
- Sericulture became an important cottage industry in Brazil, China, France, India, Italy, Japan, Korea, and Russia.
- Trees were introduced to North America in colonial times in an effort to establish a silk industry. The industry never took hold, but the trees escaped cultivation and naturalized throughout much of the US, as

it hybridizes readily with native *Morus rubra*. A fruitless cultivar was developed for sericulture, but is now sometimes grown ornamentally where fruit is not desired.

- Today, China and India are the two main producers, producing more than 60% of the world's silk.

#### Silk Production:

- *Bombyx mori* (silkworms, caterpillars of the domestic silk moth) are the most widely used and most intensively studied species, although there are several other commercial species

- Female silk moth lays 300- 500 eggs

- When they hatch, larvae are placed on trays and fed mulberry leaves

- After the fourth moult, a twig is placed near them to climb to a prepared twig frame on which they can spin their cocoons

- They spin a cocoon using a continuous filament approximately 1 mile long comprised of fibroin protein secreted from two salivary glands in the head and a gum called sericin, which cements the filaments. The silk solidifies when it contacts the air.

- The cocoons are boiled, killing the silkworm and degumming the cocoons of sericin, freeing the silk filaments for reeling. The outside is brushed to find the outside end.

- Silk filaments are wound on a reel. At this point it is known as raw silk. It takes about 2500 silkworms to produce 1 lb of raw silk.

- Single filaments are combined to form thread. One thread comprises up to 48 individual silk filaments.

- Threads may be plied to form yarn

- After dyeing, raw silk is packaged according to quality.

- Mahatma Gandhi was critical of silk production based on the Ahimsa (the key virtue or principle in Dharmic religions of non-violence) philosophy, and he promoted Ahimsa silk (made without boiling the pupa and also wild silk (made from cocoons of wild and semi-wild silk moths))

- The Ethical Treatment of Animals (PETA) also urges people not to buy silk items

#### The Silk Road

- Was and is a network of land and sea routes connecting East and West since the 2<sup>nd</sup> century BC, contributing to the development of the civilizations of China, Korea, Japan, the Indian subcontinent, Iran, Europe, the horn of Africa, and Arabia, and opening long-distance political and economic relations between these civilizations.

- Besides the lucrative trade of silk, many other goods and ideas were exchanged, including religions (for example, the spread of Buddhism from India to China), syncretic (the combining of different beliefs and schools of thought) philosophies, scientific discoveries, and technologies like paper and gunpowder.

Cultural and economic trade.

- As well as diseases like the plague!

<https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=251234>

<https://landscapeplants.oregonstate.edu/plants/morus-alba-unryu>

[https://en.wikipedia.org/wiki/Morus\\_alba](https://en.wikipedia.org/wiki/Morus_alba)

[https://en.wikipedia.org/wiki/Morus\\_\(plant\)](https://en.wikipedia.org/wiki/Morus_(plant))

<https://en.wikipedia.org/wiki/Sericulture>

[https://en.wikipedia.org/wiki/Silk\\_Road](https://en.wikipedia.org/wiki/Silk_Road)

[https://www.researchgate.net/publication/263392494\\_Natural\\_durability\\_of\\_Mulberry\\_wood\\_from\\_Iran](https://www.researchgate.net/publication/263392494_Natural_durability_of_Mulberry_wood_from_Iran)