

Morus

See text.

Morus, a genus of flowering plants in the family Moraceae, consists of diverse species of deciduous trees commonly known as mulberries, growing wild and under cultivation in many temperate world regions.[1][2][3] Generally, the genus has 64 subordinate taxa,[4] three of which are well-known and are ostensibly named for the fruit color of the best-known cultivar: white, red, and black mulberry (*Morus alba*, *M. rubra*, and *M. nigra*, respectively), with numerous cultivars and some taxa currently unchecked and awaiting taxonomic scrutiny.[5][4] *M. alba* is native to South Asia, but is widely distributed across Europe, Southern Africa, South America, and North America.[2] *M. alba* is also the species most preferred by the silkworm, and is regarded as an invasive species in Brazil and the United States.[2]

The closely related genus *Broussonetia* is also commonly known as mulberry, notably the paper mulberry (*Broussonetia papyrifera*).[6]

Despite their similar appearance, mulberries are not closely related to raspberries or blackberries. All three species belong to the Rosales order. But while the mulberry is a tree belonging to the Moraceae family (also including the fig, jackfruit, and other fruits), raspberries and blackberries are brambles and belong to the Rosaceae family (also including the apple, peach, and other fruits).

Mulberries are fast-growing when young, and can grow to 24 metres (79 feet) tall.[2][5] The leaves are alternately arranged, simple, and often lobed and serrated on the margin. Lobes are more common on juvenile shoots than on mature trees.[2][5] The trees can be monoecious or dioecious.[5]

The mulberry fruit is a multiple, about 2–3 centimetres (3⁄4–1+1⁄4 inches) long.[2][5] Immature fruits are white, green, or pale yellow.[5] The fruit turns from pink to red while ripening, then dark purple or black, and has a sweet flavor when fully ripe.[2][5]

Clusters (inflorescences) of unopened male flower buds

Female catkins

Young mulberry fruit clusters

Immature fruit

Unripe white mulberries

Berries on branches in Eastern Oklahoma

Mulberry in southern Brazil

Long mulberry

Semi-ripe mulberries on a mulberry leaf

Autumn foliage

The taxonomy of *Morus* is complex and disputed. Fossils of *Morus* appear in the Pliocene record of the Netherlands.[7] Over 150 species names have been published, and although differing sources may cite different selections of accepted names, less than 20 are accepted by the vast majority of botanical authorities. *Morus* classification is even further complicated by widespread hybridisation, wherein the hybrids are fertile.[citation needed]

The following species are accepted:[8]

In southern Brazil, the mulberry is known as *amorinha*.[9]

Black, red, and white mulberries are widespread in Southern Europe, the Middle East, northern Africa, and the Indian subcontinent, where the tree and the fruit have names under regional dialects. Black mulberry was imported to Britain in the 17th century in the hope that it would be useful in the cultivation of silkworms. It was much used in folk medicine, especially in the treatment of ringworm. Mulberries are also widespread in Greece, particularly in the Peloponnese, which in the Middle Ages was known as Morea, deriving from the Greek word for the tree (μούρι, mouria).

Mulberries can be grown from seed, and this is often advised, as seedling-grown trees are generally of better shape and health. Mulberry trees grown from seed can take up to ten years to bear fruit. Mulberries are most often planted from large cuttings, which root readily. The mulberry plants allowed to grow tall have a crown height of 1.5 to 1.8 m (5 to 6 ft) from ground level and a stem girth of 10–13 cm (4–5 in). They are specially raised with the help of well-grown saplings 8–10 months old of any of the varieties recommended for rainfed areas like S-13 (for red loamy soil) or S-34 (black cotton soil), which are tolerant to drought or soil-moisture stress conditions. Usually, the plantation is raised and in block formation with a spacing of 1.8 by 1.8 m (6 by 6 ft), or 2.4 by 2.4 m (8 by 8 ft), as plant-to-plant and row-to-row distances. The plants are usually pruned once a year during the monsoon season to a height of 1.5–1.8 m (5–6 ft) and allowed to grow with a maximum of 8–10 shoots at the crown. The leaves are harvested three or four times a year by a leaf-picking method under rain-fed or semiarid conditions, depending on the monsoon. The tree branches pruned during the fall season (after the leaves have fallen) are cut and used to make durable baskets supporting agriculture and animal husbandry.

Some North American cities have banned the planting of mulberries because of the large amounts of pollen they produce, posing a potential health hazard for some pollen allergy sufferers.[10] Actually, only the male mulberry trees produce pollen; this lightweight pollen can be inhaled deeply into the lungs, sometimes triggering asthma.[11][12] Conversely, female mulberry trees produce all-female flowers, which draw pollen and dust from the air. Because of this pollen-absorbing feature, all-female mulberry trees have an OPALS allergy scale rating of just 1 (lowest level of allergy potential), and some consider it "allergy-free".[11]

Mulberry tree scion wood can easily be grafted onto other mulberry trees during the winter, when the tree is dormant. One common scenario is converting a problematic male mulberry tree to an allergy-free female tree, by grafting all-female mulberry tree scions to a male mulberry that has been pruned back to the trunk.[13] However, any new growth from below the graft(s) must be removed, as they would be from the original male mulberry tree.[14]

All parts of the plant besides the ripe fruit contain a toxic milky sap.[15] Eating too many berries may have a laxative effect. Additionally, unripe green fruit may cause nausea, cramps, and a hallucinogenic effect.[16]

Raw mulberries are 88% water, 10% carbohydrates, 1% protein, and less than 1% fat. In a 100-gram (3.5-ounce) reference amount, raw mulberries provide 43 calories, 44% of the Daily Value (DV) for vitamin C, and 14% of the DV for iron; other micronutrients are insignificant in quantity.

As the fruit matures, mulberries change in texture and color, becoming succulent, plump, and juicy, resembling a blackberry.[5] The color of the fruit does not distinguish the mulberry species, as mulberries may be white, lavender or black in color. White mulberry fruits are typically sweet, but not tart, while red mulberries are usually deep red, sweet, and juicy. Black mulberries are large and juicy, with balanced sweetness and tartness.[5]

The fruit of the East Asian white mulberry – a species extensively naturalized in urban regions of eastern North America – has a different flavor, sometimes characterized as refreshing and a little tart, with a bit of gumminess to it and a hint of vanilla.[17] In North America, the white mulberry is considered an invasive exotic and has taken over extensive tracts from native plant species, including the red mulberry.[2][18]

Mulberries are used in pies, tarts, wines, cordials, and herbal teas.[2][5] The fruit of the black mulberry (native to southwest Asia) and the red mulberry (native to eastern North America) have distinct flavors likened to 'fireworks in the mouth'.[17] Jams and sherbets are often made from the fruit in the Old World.

The tender twigs are semisweet and can be eaten raw or cooked.[19]

The fruit and leaves are sold in various forms as dietary supplements.[citation needed]

Mulberry leaves, particularly those of the white mulberry, are ecologically important as the sole food source of the silkworm (*Bombyx mori*, named after the mulberry genus *Morus*), the cocoon of which is used to make silk.[20][21] The wild silk moth also eats mulberry.[22][23] Other Lepidoptera larvae—which include the common emerald, lime hawk-moth, sycamore moth, and fall webworm—also eat the plant.[24]

The Ancient Greeks and Romans cultivated the mulberry for silkworms; at least as early as 220 AD, Emperor Elagabalus wore a silk robe.[25] English clergy wore silk vestments from about 1500 onwards.[25] Mulberry and the silk industry played a role in colonial Virginia.[25]

Mulberry fruit color derives from anthocyanins,[3] which have unknown effects in humans.[26] Anthocyanins are responsible for the attractive colors of fresh plant foods, including orange, red, purple, black, and blue.[26] These colors are water-soluble and easily extractable, yielding natural food colorants.[2] Due to a growing demand for natural food colorants, they have numerous applications in the food industry.[3][26]

A cheap and industrially feasible method has been developed to extract anthocyanins from mulberry fruit that could be used as a fabric dye or food colorant of high color value (above 100).[2] Scientists found that, of 31 Chinese mulberry cultivars tested, the total anthocyanin yield varied from 148 to 2725 mg/L of fruit juice.[27] Sugars, acids, and vitamins of the fruit remained intact in the residual juice after removal of the anthocyanins, indicating that the

juice may be used for other food products.[27][2]

Mulberry germplasm resources may be used for:[3][2][28]

During the Angkorian age of the Khmer Empire of Southeast Asia, monks at Buddhist temples made paper from the bark of mulberry trees. The paper was used to make books, known as kraing.[29]

Tengujo is the thinnest paper in the world. It is produced in Japan and made with kozo (stems of mulberry trees).[30]

The wood of mulberry trees is used for barrel aging of ■uic■, a traditional Romanian plum brandy.

A Babylonian etiological myth, which Ovid incorporated in his *Metamorphoses*, attributes the reddish-purple color of the mulberry fruits to the tragic deaths of the lovers Pyramus and Thisbe. Meeting under a mulberry tree (probably the native *Morus nigra*),[31] Thisbe commits suicide by sword after Pyramus does the same, he having believed, on finding her bloodstained cloak, that she was killed by a lion. Their splashed blood stained the previously white fruit, and the gods forever changed the mulberry's colour to honour their forbidden love.[31]

The nursery rhyme "Here We Go Round the Mulberry Bush" uses the tree in the refrain, as do some contemporary American versions of the nursery rhyme "Pop Goes the Weasel".[citation needed]

Vincent van Gogh featured the mulberry tree in some of his paintings, notably *Mulberry Tree* (Mûrier, 1889, now in Pasadena's Norton Simon Museum). He painted it after a stay at an asylum, and he considered it a technical success.[32]

