

# Morus alba

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## INTRODUCTORY

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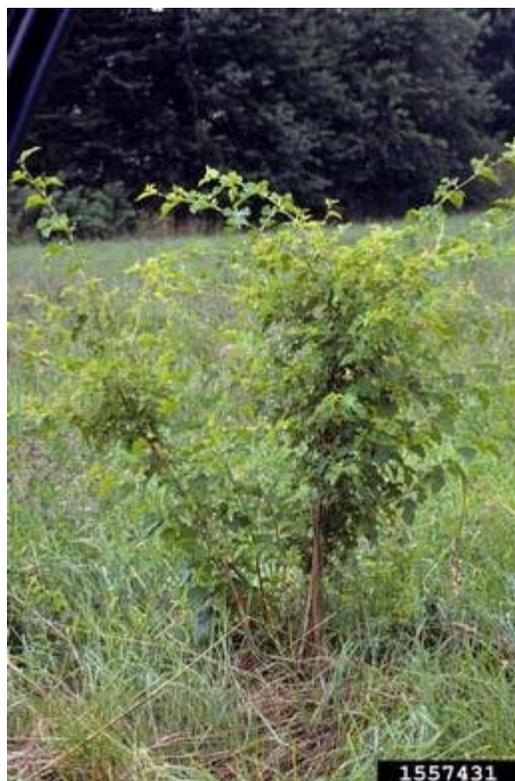


Photo by Ohio State Weed Lab Archive, Ohio State University, Bugwood.org

### AUTHORSHIP AND CITATION:

Stone, Katharine R. 2009. *Morus alba*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2009, November 30].

### FEIS ABBREVIATION:

MORALB

### NRCS PLANT CODE [[163](#)]:

MOAL

#### COMMON NAMES:

white mulberry  
mulberry  
Russian mulberry  
silkworm mulberry

#### TAXONOMY:

The scientific name of white mulberry is *Morus alba* L. (Moraceae) [[44,72](#)].

In North America, white mulberry hybridizes with the native red mulberry (*M. rubra*) ([[18,153,171,174](#)], review by [[30](#)]). Both species are highly variable and frequently confused with each other [[44](#)].

Numerous white mulberry cultivars occur in North America ([[11,32,41](#)], review by [[33](#)]).

#### SYNONYMS:

None

#### LIFE FORM:

Tree-shrub

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## DISTRIBUTION AND OCCURRENCE

**SPECIES:** *Morus alba*

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- [GENERAL DISTRIBUTION](#)
- [HABITAT TYPES AND PLANT COMMUNITIES](#)

#### GENERAL DISTRIBUTION:

White mulberry is native to China [[23,110,168](#)] and was introduced to North America in the 1600s (reviews by [[18,33](#)]). In 1624 the legislature of Virginia required every male resident to plant at least 4 white mulberry trees to promote a North American silk industry. By the 1830s, the potential for a silk industry prompted a horticultural phenomenon known as "mulberry mania" in the eastern United States. In the late 1830s, white mulberry plantations in the Northeast were killed by cold winters and those in the South were killed by disease, halting the planting of white mulberry. However, white mulberry seeds were imported from Europe in the 1860s to promote a silk industry in Utah (review by [[106](#)]).

White mulberry has established outside of cultivation in many areas [[11,25,56,57,96,105,110,122,148,168,173,179,180](#)]. As of this writing (2009), white mulberry is widely distributed across North America, occurring across all of the United States with the exceptions of Nevada and Alaska. In Canada, it is found in British Columbia, Ontario, and Quebec. [Plants Database](#) provides a distribution map of white mulberry.

#### HABITAT TYPES AND PLANT COMMUNITIES:

**Plant community descriptions:** Though it is found across the United States, white mulberry occurs in some plant communities more frequently than others. Many sources report it as occurring in floodplain or riparian communities, or in plant communities within the range of the native red mulberry. Descriptions in the literature suggest that white mulberry dominates plant communities infrequently, usually occurring at relatively low levels compared to other species.

Reported density and basal area of white mulberry in plant communities in the United States				
Location	Plant community	Size class*	Density**	Basal area***
Northern Great Plains				
Eastern Nebraska	oak ( <i>Quercus</i> spp.)-basswood ( <i>Tilia americana</i> ) forest	8-20.0 cm DBH	7	0.1 [ <a href="#">129</a> ]
Great Lakes				
Southwestern Indiana	bottomland successional forest	understory tree	11	0.02 [ <a href="#">117</a> ]
Indiana	old-growth oak-hickory ( <i>Carya</i> spp.) forest	<3 m in height	0-3 stems/1 m <sup>2</sup>	not reported [ <a href="#">171</a> ]
Southwestern Michigan	abandoned old field	not reported	0.17 stems/200 m <sup>2</sup>	not reported [ <a href="#">45</a> ]
Central Ohio	riparian bottomland forest	not reported	36	not reported [ <a href="#">36</a> ]
North-central Ohio	second-growth mixed hardwood forest	tree	0.17	14.2 cm <sup>2</sup> /ha [ <a href="#">175</a> ]
West-central Ohio	northern whitecedar ( <i>Thuja occidentalis</i> ) forest	≥10 cm DBH	30	0.5 [ <a href="#">76</a> ]
Northeast				
Northern Delaware	hardwood forest	sapling	11.65	0.1 cm <sup>2</sup> /ha [ <a href="#">97</a> ]
Northern New Jersey	mature oak-hickory forest	sapling	0.09 stems/100 m <sup>2</sup>	not reported [ <a href="#">169</a> ]
Bronx, New York	black locust ( <i>Robinia pseudoacacia</i> ) forest	seedlings and saplings	125.53	0.64
		≥5 cm DBH	21.28	0.54
	oak-maple ( <i>Acer</i> spp.) forest	≥5 cm DBH	11.67	0.17 [ <a href="#">182</a> ]
New York County, New York	northern red oak ( <i>Quercus rubra</i> ) ridge forest	subcanopy tree	6	not reported
	yellow-poplar ( <i>Liriodendron tulipifera</i> ) valley forest	subcanopy tree	9	not reported [ <a href="#">43</a> ]
North-central Virginia	mixed hardwood forests	not reported	33	0.65 [ <a href="#">70</a> ]
South-Central United States				
Southern Louisiana	floodplain forest	mature tree	2.3	0.7 [ <a href="#">170</a> ]
Central Oklahoma	post oak ( <i>Q. stellata</i> )-blackjack oak ( <i>Q. marilandica</i> ) forest	2.5-12.7 cm DBH	3.29	not reported
		>12.7 cm DBH	1.95	not reported [ <a href="#">128</a> ]
West-central				

Texas	riparian forest	not reported	3	not reported [164]
*Description follows source **Stems/ha unless labeled otherwise *** m <sup>2</sup> /ha unless labeled otherwise				

Reports of white mulberry as common or dominant include riparian, floodplain, or bottomland forests in Arizona [178], Illinois [26], Iowa [26,98], Missouri [26], Nebraska [130], New Mexico [72], Ohio [36], Texas [131], Virginia [3], and Washington [91,92], sand prairies in Kansas [119], upland forests on a Potomac River island [155], second-growth forests on an island in Lake Erie [121], and black locust and oak-maple plant associations in New York [182].

This section includes descriptions of plant communities where white mulberry occurs in the following geographic areas: [Northern Great Plains](#), [Great Lakes](#), [Northeast](#), [South-central United States](#), [Southern Appalachians](#), [Southeast](#), [Southwest](#), [California](#), and [Pacific Northwest](#). Within geographic areas, descriptions are organized by plant communities where white mulberry is reported as common or dominant, uncommon or rare, or relative abundance is unknown.

**Northern Great Plains:** In the Northern Great Plains white mulberry occurs most frequently in riparian or floodplain forests, though it occasionally establishes on upland sites. While most forest communities with white mulberry are dominated by deciduous trees, it occasionally occurs in forests with eastern redcedar (*Juniperus virginiana*). It also establishes in fields and in prairie plant communities.

White mulberry and basswood were "important" species occurring in elm-hackberry (*Ulmus* spp. -*Celtis occidentalis*) plant communities along small streams in southeastern Iowa [98]. In "savanna-like" riparian forests surrounded by mixed-grass prairie uplands in south-central Nebraska, white mulberry codominated with bur oak (*Q. macrocarpa*), green ash (*Fraxinus pennsylvanica*), and silver maple (*Acer saccharinum*) [130]. In the sand prairies of south-central Kansas, white mulberry was a common, widely distributed plant along dune slopes, tops of dunes, and in low areas between dunes in the sand sagebrush-bluestem (*Artemisia filifolia*-*Andropogon* spp.) prairie plant community [119].

White mulberry was an uncommon species in transitional oak-basswood forests in the Lower Platte River Valley in eastern Nebraska [129]. White mulberry was scarce in gallery forests dominated by bur oak, hackberry, and chinkapin oak (*Q. muehlenbergii*) along streams in the bluestem prairie region in northern Kansas [46]. In the tallgrass prairie region of Kansas, white mulberry occurred infrequently in warm-season hay meadows, warm-season pastures, cool-season pastures, and Conservation Reserve Program fields [73]. In the shortgrass prairie region of eastern Colorado, a single white mulberry tree was recorded in riparian forests dominated by eastern cottonwood (*Populus deltoides*), peachleaf willow (*Salix amygdaloides*), and the nonnative Russian-olive (*Elaeagnus angustifolia*) [79].

There are several reports of white mulberry occurring at unknown densities in floodplain forests in the Northern Great Plains [52,81,82,98,107,142,152]. Characteristic species in floodplain forests include eastern cottonwood, boxelder (*A. negundo*), American elm (*Ulmus americana*), and dogwood (*Cornus* spp.) in southeastern South Dakota [142,152], silver maple and eastern cottonwood in southeastern Iowa [98], plains cottonwood (*Populus deltoides* subsp. *monilifera*) and peachleaf willow in Kansas [52], and bur oak, black walnut (*Juglans nigra*), green ash, boxelder, eastern cottonwood, Kentucky coffeetree (*Gymnocladus dioica*), and red mulberry in eastern Kansas [82]. River- and streamside woodlands in north-central Kansas were similar in composition to floodplain forests in eastern Kansas but also contained American elm, slippery elm (*U. rubra*), hackberry, and honey-locust (*Gleditsia triacanthos*) [107]. In southeastern Kansas, white mulberry occurred in sandy lowland woods on hillsides, where chinkapin oak, Shumard oak (*Q. shumardii*), bitternut hickory (*Carya cordiformis*), and American elm were common [82].

White mulberry occurs in unknown densities in several upland plant communities in the Northern Great Plains. It established in a sandsage prairie community in southwestern Kansas where sand sagebrush was the dominant shrub and sand dropseed (*Sporobolus cryptandrus*) and blue grama (*Bouteloua gracilis*) were the most abundant understory grasses [69]. In southeastern South Dakota, white mulberry occurred in shingle oak (*Q. imbricaria*)-bur oak forests [98]. In the same region, it occurred in planted farmstead woodlots with elm, green ash, boxelder, and hackberry [151]. In west-central Iowa, white mulberry seeds were present in the seed bank in eastern redcedar woodlands, deciduous

shrub communities with roughleaf dogwood (*Cornus drummondii*) and elms, tallgrass prairie dominated by big bluestem (*Andropogon gerardii*) and indiagrass (*Sorghastrum nutans*), and midgrass prairie dominated by little bluestem (*Schizachyrium scoparium*) and sideoats grama (*Bouteloua curtipendula*) [127]. In south-central Nebraska, white mulberry occurred in a mixed-grass prairie dominated by sideoats grama, buffalo grass (*Buchloe dactyloides*), and little bluestem [139].

**Great Lakes:** In the Great Lakes region, white mulberry occurs most frequently in mixed-hardwood forests, which may be in riparian, floodplain, or upland areas. White mulberry also occurs in some coniferous forest types, old fields, and prairie plant communities.

White mulberry was common in riparian forests in Missouri, Illinois, and Iowa. Other common species included boxelder, silver maple, American sycamore (*Platanus occidentalis*), eastern cottonwood, pin oak (*Q. palustris*), black willow (*S. nigra*), American elm, hackberry, sugarberry (*Celtis laevigata*), green ash, and red mulberry [26]. In central Ohio, white mulberry was a relatively common species in riparian bottomland forests dominated by boxelder, Ohio buckeye (*Aesculus glabra*), eastern cottonwood, and American sycamore [36]. White mulberry was common on an island in Lake Erie in second-growth forests dominated by eastern redcedar; hackberry, maple, domestic fruit trees, and red mulberry were also common [121].

Several sources report white mulberry as uncommon or infrequent in the Great Lakes region. In southeastern Ohio, white mulberry was a rare species in floodplain forests dominated by silver maple, boxelder, American elm, American sycamore, black walnut, and Ohio buckeye [65]. White mulberry was uncommon in oak forests in southeastern Michigan [62] and northwestern Ohio [40], remnant old-growth oak-hickory forests in Indiana [171], sugar maple (*Acer saccharum*)-oak ravine and slope forests in central Illinois [42], streamside sugar maple forests in central Illinois [6], and second-growth American beech (*Fagus grandifolia*)-sugar maple forests in north-central Ohio [175].

White mulberry occurs in unknown densities in several mixed hardwood forest communities in the Great Lakes region, including disturbed pin oak and willow oak (*Q. phellos*) forest [114] and lowland American elm, sugar maple, and yellow-poplar forest in southern Illinois [104], oak-hickory secondary "woodlots" in western Ohio [115], and mixed deciduous forests in southern Ontario [18,37]. Two years after a clearcut, white mulberry seeds were found in soil samples from a southern Ontario woodlot that contained white ash, sugar maple, quaking aspen (*Populus tremuloides*), and black cherry (*Prunus serotina*) prior to treatment [15]. White mulberry occurred in northern whitecedar forests in west-central Ohio [76], sand prairie communities in central Illinois [99], and prairie remnants in northwestern Illinois [8].

White mulberry established on sites revegetating after human development or old field abandonment. On the Lake Erie Islands archipelago, white mulberry occurred in secondary mixed hardwood forests developing on former upland orchards, vineyards, and quarries, with highest importance values in former orchards. It was not found in nearby mature upland or lowland forest [9]. In southwestern Michigan, white mulberry occurred in 5-year-old old fields, establishing around stands of staghorn sumac (*Rhus typhina*) [45].

**Northeast:** White mulberry occurs most frequently in a variety of mixed-hardwood forest communities in the Northeast region, including floodplain, lowland, upland, and ravine forests. White mulberry also occurs in forests with some coniferous species such as eastern white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*), as well as on sand flats.

White mulberry was reported as common or frequent in a few deciduous plant communities in the Northeast. Near Bronx, New York, white mulberry occurred as a relatively common species along edges and in gaps of both black locust and oak-maple plant associations [182]. In northeastern Virginia, white mulberry was frequent in floodplain forests dominated by ashes, elms, hackberry, red maple, shingle oak, boxelder, and American sycamore [3]. On an island in the Potomac River, white mulberry was the 3rd most dominant species after American elm and boxelder in an upland deciduous forest [155].

Several sources report white mulberry as uncommon or infrequent in the Northeast. In New York County, New York, white mulberry was an uncommon subcanopy tree in a yellow-poplar valley forest and a northern red oak ridge forest

[43]. In southeastern New York, white mulberry occurred at low densities in a forest established on serpentine rubble. Dominant species included northern red oak, black walnut, sugar maple, American elm, and the nonnative tree-of-heaven (*Ailanthus altissima*) and Norway maple (*A. platanoides*) [90]. In Bronx, New York, white mulberry was absent from the aboveground vegetation but present at low density in the soil seed bank in deciduous forests dominated by oaks, hickories, maples, yellow-poplar, and sweetgum [84]. White mulberry was uncommon in oak-hickory forests in northern New Jersey [169] and eastern Maryland [144], deciduous floodplain forests along the Raritan River in New Jersey [16,47], and lowland and floodplain forests dominated by oaks, sweetgum (*Liquidambar styraciflua*), and red maple in eastern Maryland [144].

White mulberry occurred in unknown densities in mixed hardwood forests in northern Delaware [97], Pennsylvania [68], and Virginia [70,172]. In Massachusetts, white mulberry was found in forests dominated by oaks and hickories, along with variable amounts of eastern white pine and eastern hemlock [7]. White mulberry established under eastern cottonwood in early-successional plant communities on sand-flats along the Hudson River, New York [102,103]. White mulberry occurred in constructed wetlands near a Delaware River tidal marsh in New Jersey. Overstory species included American sycamore, river birch (*Betula nigra*), blackberry (*Rubus* spp.), willow, and grape (*Vitis* spp.) [89].

South-central United States: In the South-central United States, white mulberry occurs in floodplain, riparian, oak, oak-hickory, and canyon-bottom forests, as well as prairie and coastal ridge plant communities.

In the northeastern corner of the Texas panhandle, white mulberry was locally frequent in river-bottom woodlands dominated by cottonwood (*Populus* spp.) [131].

Several sources report white mulberry as uncommon or infrequent in the South-central United States. In west-central Texas, white mulberry was widespread but uncommon in riparian forests dominated by Ashe juniper (*Juniperus ashei*), cedar elm (*U. crassifolia*), American sycamore, and Texas persimmon (*Diospyros texana*) [164]. In central Missouri, white mulberry was an uncommon species in a floodplain oak-hickory forest [35]. In west-central Oklahoma, white mulberry was an uncommon species in deciduous canyon-bottom sugar maple forests surrounded by tallgrass prairie and blackjack oak woodlands [93]. White mulberry was present in low numbers in a 15- to 20-year-old revegetating lead and zinc mine spoil site in northeastern Oklahoma. The establishing forest was dominated by eastern cottonwood, black willow, American elm, slippery elm, and northern catalpa (*Catalpa speciosa*) [54]. In southwestern coastal Louisiana, white mulberry was an infrequent species in prairie, coastal ridge, and mixed-woods plant communities [39].

In Oklahoma, white mulberry occurred in open post oak-blackjack oak forest [128] and planted windbreaks surrounded by bluestem-blue grama prairie and blue grama-buffalo grass plains [94]. In southeastern Louisiana, white mulberry occurred in disturbed areas on spoil banks within the bottomland hardwood forest plant community. Typical species occurring on spoil banks included black willow, sugarberry, American black elderberry (*Sambucus canadensis*), Jesuit's bark (*Iva frutescens*), and groundsel-tree (*Baccharis halimifolia*) [27]. In southern Louisiana, white mulberry occurred in floodplain forests on levee ridges dominated by the nonnative tallowtree (*Triadica sebifera*) and native species such as live oak (*Q. virginiana*) and sugarberry [170].

Southern Appalachian: In the Southern Appalachian region, white mulberry occurs in bottomland, riparian, cove, and suburban hardwood forests. It was not reported as common in any plant community description. In southwestern Indiana, white mulberry was found at low levels in the understory of bottomland successional forests dominated by sweetgum and red maple [117]. In southwestern Kentucky, white mulberry was found in low, moist woods, where characteristic species included boxelder, green ash, and river birch [61]. White mulberry was an occasional species in mixed mesophytic, deciduous cove floor forests in southeastern Tennessee. Common canopy species included American beech, basswood, and black oak (*Q. velutina*) [24]. In northwestern Tennessee, white mulberry occurred with boxelder, silver maple, and green ash in riverbank [75] and bottomland [22] hardwood forests. In northeastern Alabama, white mulberry occurred along creeks and streams in alluvial forests with yellow-poplar, water oak, and American bladdernut (*Staphylea trifolia*) [10]. Near Atlanta, Georgia, white mulberry occurred in an uneven-aged suburban forest dominated by yellow-poplar, white oak, hickories, loblolly pine (*P. taeda*), American beech, and northern red oak [49].

Southeast: In the Southeast region, white mulberry occurs in riparian forests, shrub thickets, and other hardwood forests. On an island off the coast of North Carolina, white mulberry was the 4th most common species in a maritime shrub thicket dominated by yaupon (*Ilex vomitoria*) [101]. In central North Carolina, white mulberry occurred with many other nonnative species in urban riparian forests containing a mixture of American sycamore, red maple, yellow-poplar, sweetgum, oaks, and hickories [167]. White mulberry occurred in mesic hardwood forests in southeastern Alabama. Dominant canopy vegetation included southern magnolia (*Magnolia grandiflora*), sweetbay (*Magnolia virginiana*), white oak, yellow-poplar, American beech, and black tupelo (*Nyssa sylvatica*) [132]. White and red mulberry were identified from Public Land Survey records as occurring in upland oak-hickory forests in northern Florida [134].

Southwest: As of this writing (2009), all reports of white mulberry in the Southwest region are from riparian or floodplain forest communities. Along the Middle River Grande River, New Mexico, white mulberry was a common nonnative species in floodplain forests dominated by eastern cottonwood [72]. In central Arizona, white mulberry occurred in riparian areas along the Hassayampa River. It was frequent on severely disturbed mesquite (*Prosopis* sp.) terraces, where most of the mesquite was removed, and was a rare species in streamside, non-emergent herbaceous areas and along floodplain terraces dominated by mule-fat (*Baccharis salicifolia*) [178]. In southeastern Arizona, white mulberry was found in the soil seed bank (but not in extant vegetation) of a riparian deciduous forest dominated by Arizona sycamore (*Platanus wrightii*), bigtooth maple (*A. grandidentatum*), velvet ash (*Fraxinus velutina*), and gray oak (*Q. grisea*) [125]. White mulberry was also found on riparian sites in the Grand Canyon area of northwestern Arizona [145].

California: One report describes white mulberry occurring in a riparian forest community in California. White mulberry was an uncommon tree in Central Valley riparian forests. Common trees included boxelder, California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), and willows (*Salix* spp.) [126]. No additional information was available regarding white mulberry occurrence in California as of this writing (2009).

Pacific Northwest: Two reports describe white mulberry as occurring in a riparian forest community in the Pacific Northwest region. White mulberry was a dominant species in riparian forests along the Snake River in eastern Washington. Other dominants included willow (*Salix* sp.), netleaf hackberry (*Celtis reticulata*), and golden currant (*Ribes aureum*) [91,92]. Adjacent plant communities included a willow flat, an open field dominated by cheatgrass (*Bromus tectorum*), lambsquarters (*Chenopodium album*), and prickly lettuce (*Lactuca serriola*), and a sage flat dominated by big sagebrush (*Artemisia tridentata*) and cheatgrass [92]. No additional information was available regarding white mulberry occurrence in the Pacific Northwest region as of this writing (2009).

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## BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: *Morus alba*

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- [GENERAL BOTANICAL CHARACTERISTICS](#)
- [SEASONAL DEVELOPMENT](#)
- [REGENERATION PROCESSES](#)
- [SITE CHARACTERISTICS](#)
- [SUCCESSIONAL STATUS](#)

GENERAL BOTANICAL CHARACTERISTICS:

- [Botanical description](#)
- [Raunkiaer life form](#)

**Botanical description:** This description covers characteristics that may be relevant to fire ecology and is not meant for identification. Keys for identification are available (e.g., [[11,25,44,56,57,60,105,122,148,173](#)]).

**Aboveground description:** White mulberry grows as a dense, round-topped, perennial shrub or tree (review by [[33](#)]), reaching heights around 50 feet (15 m) [[44](#)]. The thin bark is shallowly furrowed and has long, narrow ridges [[44](#)]. White mulberry leaves are alternate, simple, ovate, 2 to 4 inches (6-10 cm) long and 1 to 2 inches (3-6 cm) wide, with margins varying from coarsely serrate to deeply lobed and serrate. Leaves exude a milky juice when broken. Staminate and pistillate flowers develop in separate catkins [[143](#)]. Plants are typically dioecious [[18,48](#)] and occasionally monoecious [[21](#)]. White mulberry fruits are cylindrical drupes, 0.5 to 1.0 inches (1.5-2.5 cm) long. Fruits may be black, purple, or white. The ovoid nutlet has a thin, soft shell [[143](#)], and the seed has a "hard bony coat" [[85](#)].



White mulberry fruit.

Photo by Robert Vidéki, Doronicum Kft.,  
Bugwood.org

**Belowground description:** White mulberry has a wide, spreading root system ([[41,138,143](#)], review by [[30](#)]), with both a tap root and lateral roots [[138](#)]. Roots are large in diameter close to the root crown but decrease rapidly in size, branching within a few feet of the root crown into numerous fibrous roots [[17](#)]. Roots of a 21-year-old white mulberry penetrated approximately 7 feet (2 m) deep and had a 22-foot (7 m) lateral spread in silty clay loam soil in eastern Nebraska [[138](#)]. In Oklahoma, 5 planted white mulberry trees penetrated to a depth of 13 feet (4 m) in a deep silt loam. The longest lateral root extension was 42 feet (13 m). Most lateral roots occurred in the upper 1 to 3 feet (0.3-1 m) of soil, and no lateral roots occurred below 5 feet (2 m); average lateral root spread was calculated at 190 to 330 ft<sup>2</sup> [[17](#)].

**Life span:** White mulberry trees may have a long life span; at Mt. Vernon, a white mulberry planted by George Washington in 1785 was alive as of 1990 (review by [[106](#)]). There are records of 150-year-old white mulberry trees in Greece (review by [[86](#)]) and a 120-year-old planted white mulberry tree in Utah (review by [[106](#)]).

### **Raunkiaer [[124](#)] life form:**

[Phanerophyte](#)

### **SEASONAL DEVELOPMENT:**

White mulberry generally flowers from April to May [[32,49,60,105,119,177](#)], with earlier flowering in March in the Carolinas [[122](#)], and later flowering into June in the upper Midwest (review by [[30](#)]). White mulberry fruits begin forming in May [[60,119,122](#)] and may continue developing into late July [[140](#)].

### **REGENERATION PROCESSES:**

- [Pollination and breeding system](#)
- [Seed production](#)
- [Seed dispersal](#)
- [Seed banking](#)
- [Germination](#)

- [Seedling establishment and plant growth](#)
- [Vegetative regeneration](#)

White mulberry reproduces by seed. Following injury, white mulberry may regenerate vegetatively via sprouting from the stump, roots, or cut stems, though this response is not widely documented.

**Pollination and breeding system:** White mulberry is generally dioecious [18,48], though monoecious plants are occasionally found [21]. It is wind pollinated [181].

**Seed production:** White mulberry reproduces by seed (review by [30]). In northeastern Kansas, white mulberry plants produced an average of 22.52 seeds/fruit, and fruits remained on plants an average of 3.1 days [140].

**Seed dispersal:** White mulberry fruits are eaten and dispersed by animals, including birds ([23,71,113,121,173], review by [30]), red foxes [83], northern raccoons, Virginia opossums, squirrels [71], and other mammals (review by [30]). Box turtles may disperse white mulberry seeds [12]. Many seeds fall near the base of the parent plant [32].

**Seed banking:** A forestry handbook from India lists white mulberry seeds as viable for 720 days [111]. Tests at a nursery in Nebraska found that, while white mulberry seeds remained viable for at least a year when stored in cool, sealed conditions, they deteriorated rapidly upon removal from storage [154].

White mulberry seeds have been found in soil samples even when mature plants are not present in extant vegetation, though the seeds were not always viable. White mulberry was absent from aboveground vegetation but present at low density in the soil seed bank in deciduous forests in Bronx, New York, with viable seeds occurring at a soil depth of 0 to 4 inches (0-10 cm) [84]. White mulberry seeds were detected in 32% of soil samples taken from a woodlot in southern Ontario in November, occurring in samples at a density of 334.8 seeds/m<sup>2</sup>. These seeds were not viable in seedling emergence trials [15]. In west-central Iowa, white mulberry seeds were present in the seed bank in coniferous woodland, deciduous shrub, tallgrass prairie, and midgrass prairie plant communities. Neither the viability of these seeds nor white mulberry's presence in the aboveground vegetation were reported [127]. In southeastern Arizona, white mulberry was found in the soil seed bank of a riparian deciduous forest but was not found in extant vegetation [125].

**Germination:** Greenhouse experiments show variable germination rates, with germination generally improving with cold stratification ([85], review by [33]), and variable results after ingestion by wildlife [12,85]. Wild-collected white mulberry seeds showed high germination rates (92.3%) in greenhouse trials where seeds were exposed to indirect sunlight and fluctuating temperatures from June to October. Germination rates were lower (78.3%) for seeds that had been ingested by box turtles prior to germination trials [12]. Another study found that dormancy of white mulberry seeds varies; seeds from the same cohort may exhibit seed coat dormancy, embryonic dormancy, or both. Seeds exhibiting all 3 types of dormancy showed improved germination following both cold stratification and digestion by American robins. Seeds had germination rates of 45.8% when just digested by American robins and 68.8% when digestion by American robins was combined with 90-day cold stratification. In contrast, control seeds with no treatment had a germination rate of 34.0% while those only exposed to cold stratification had a germination rate of 55.2%. Scarification of control seeds with a 15-minute sulfuric acid treatment reduced germination rates [85].

A forestry handbook from India reports that white mulberry seeds take 35 days to germinate [111], though one review reports an expected germination rate of 73% to 84% 8 to 12 days following 60-day stratification in sand [141].

### **Seedling establishment and plant**

**growth:** As of 2009, there was little published information regarding conditions conducive to the establishment of white mulberry. Though 1

review states that white mulberry cannot grow in shade (review by [30]), there are reports of white mulberry seedlings establishing under the cover of other vegetation [45,50,103]. In some areas, both natural [98,182] and anthropogenic [45,54,80,112,114,170,178] disturbances appear to favor the establishment of white mulberry, though not in all cases (e.g., see [70]). See [Successional Status](#) for additional information regarding white mulberry light preferences and response to disturbance.

**Growth rate:** A manual to woody landscaping plants reports that white mulberry has a fast growth rate, growing 10 to 12 feet (3-4 m) over a 4- to 6-year period (review by [33]).



White mulberry seedling.

Photo by Chuck Barger, University of Georgia,  
Bugwood.org

**Vegetative regeneration:** There is little evidence that white mulberry commonly regenerates vegetatively, though there are accounts of sprouting from stumps [150], roots (reviews by [21,136]), and cut stems buried in the soil (review by [30]). Stumps from 6-year-old plants of a white mulberry cultivar developed 5 to 8 sprouts that grew 16 to 20 inches (40-50 cm) in 1 year [150].

#### SITE CHARACTERISTICS:

**General site types:** White mulberry establishes in a variety of site types, including largely native plant communities, as well as many sites associated with human disturbance. It commonly establishes in the understory of floodplain [3,35,47,52,60,65,72,82,98,142,144,152,170,178] or riparian [26,36,53,73,79,91,92,94,99,126,130,145,164,167,178] plant communities. Floras report white mulberry occurring in wooded areas [60], "woods" [168], forest or woodland edges ([41,44,153]), dry to moist thickets [44], low stream banks, drained woods [147], or prairie hills [143].

White mulberry establishes in disturbed [44,179,180], ruderal [25,28], and "waste" areas ([41,96,177], review by [30]), including areas along roadsides ([53,60,96,153,156], review by [30]), railroad tracks [108,168], levees [156], and near dwellings [122], and in vacant lots [168], pastures ([122,158], review by [30]), fields [45,153,168], fencerows ([28,41,44,60], review by [30]), hedgerows [144,168], or windbreaks [122].

**Climate:** Given the wide geographic range of white mulberry, climate does not seem to particularly restrict its establishment. White mulberry occurs in areas with subtropical humid climates like southeastern Alabama, with long hot summers and short, mild winters [132]. It also occurs in the semiarid and continental climate of eastern Colorado, with high daily and annual temperature ranges, high potential evapotranspiration rates, and strong winds [79]. White mulberry tolerates the cold temperatures of Massachusetts, where average January temperatures are 23 °F (-5 °C) and average July temperatures are 68 °F (20 °C) [7], as well as the warm temperatures of locations like northern Alabama where average January temperatures are 45.5 °F (7.5 °C) and average July temperatures are 80.1 °F (26.7 °C) [10]. However, reports from northwestern Oklahoma indicate the tips of branches are susceptible to freezing [64], and cold winters in the Northeast killed white mulberry plantations in the 1830s (review by [106]).

White mulberry tolerates a wide range of annual precipitation, occurring in areas where reported average annual precipitation ranges from 11 inches (286 mm) in central Arizona [178] to 60 inches (1,400 mm) in northern Alabama [10].

Reported average annual precipitation for locations where white mulberry occurs in the United States	
Location	Average annual precipitation (mm)*
Northern Alabama	1,270-1,400 [10]
Central Arizona	286 [178]
Eastern Colorado	470 [79]**
Southwestern Indiana	1,140 [117]
South-central Kansas	760 [119]
Southeastern Kentucky	1,170 [133]
Massachusetts	1,190 [7]**
Southwestern Michigan	860 [45]
West-central Ohio	945 [76]
Northeastern Oklahoma	1,045 [54]
West-central Oklahoma	760 [93]
Southeastern Washington	330 [92]
*Values are for annual precipitation unless otherwise noted **Annual rainfall	

**Elevation:** In North America, white mulberry occurs from 0 to 5,000 feet (0-1,500 m) [44]. It does not appear to be restricted to particular elevations and may occur at high elevations outside North America.

Reported elevation of sites with white mulberry	
Location	Elevation (feet)
Central Arizona	2,000 [178]
Grand Canyon area of northern Arizona	3,100 [145]
Southwestern Indiana	434 [117]
Southeastern Kentucky	801-1,610 [133]
Massachusetts	300-1,000 [7]
Central Missouri	540 [35]
North-central Tennessee	350-380 [75]
Northern Pakistan	8,500 [116]

**Soil:** White mulberry occurs on a variety of soil types. One review states that white mulberry prefers rich loamy soil [141]. It establishes on silt loam in southwestern Indiana [117], central Ohio [36], and northwestern Tennessee [22], clay loam in central Missouri [35], and sandy loam in southwestern Michigan [45] and central New Jersey [47]. In northwestern Oklahoma white mulberry tolerates both sandy and loamy soil textures [64]. It is associated with sandy soil in Kansas [82,119], northeastern Oklahoma [54], coastal Louisiana [39], and southeastern New York [90].

A manual to woody landscaping plants reports that white mulberry grows best in fertile soils [33], though one review states that it tolerates poor soils [30]. White mulberry occurred on nutrient-rich soils in southeastern New York [90].

White mulberry is adapted to a range of soil pH (review by [33]). It was found on neutral soils in both northern Alabama [10] and southeastern New York, but was not found on acidic soils in southeastern New York [90]. In north-central Texas, white mulberry established in limestone areas [32].

A manual to woody landscaping plants states that white mulberry grows best in moist, well-drained soils [33], though it has established in both well-drained ([16,36,39], review by [141]) and poorly drained soils [39].

#### SUCCESSIONAL STATUS:

White mulberry is not restricted to any particular successional stage, occurring in early [45,54,103,112], mid-successional [9,47,89,115,117,121,175], and mature [169,171] plant communities. In some instances, white mulberry established secondarily after other woody species established and provided perches for seed-dispersing birds [45,102,103].

**Light:** White mulberry tolerates both open and shady conditions. A review states that it cannot grow in shade [30], and a manual to woody landscaping plants reports that it tolerates full sun to light shade [33]. In Ontario, white mulberry was generally found in more open conditions than the native red mulberry [18]. White mulberry seedlings grown in experimental field plots in Nebraska had a 53% higher growth rate when grown in sun compared to shade [100].

Though white mulberry may grow better in open conditions, it is commonly found in low-light areas such as canyon bottoms in west-central Oklahoma [93], lowland forests in southern Illinois [104], and old-growth oak-hickory forests in Indiana [171]. White mulberry seedlings established under the cover of planted pine groves in northeastern Kansas [50], eastern cottonwood in New York [103], and staghorn sumac in southwestern Michigan [45].

**Disturbance:** There is some evidence that disturbance is conducive to white mulberry establishment, though not in all cases.

Natural disturbance: In southeastern Iowa, white mulberry occurred in silver maple-eastern cottonwood floodplain plant communities, though only in gaps created by dead elms [98]. In contrast, in north-central Virginia, white mulberry had not established in debris avalanche areas 10 years after the disturbance, but was present in nearby reference mixed-hardwood forest [70]. Near Bronx, New York, white mulberry occurred as a relatively common species along edges and in gaps of both black locust and oak-maple plant communities [182]. In north-central Ohio, white mulberry was found in second-growth but not old-growth hardwood forests [175]. White mulberry also established in disturbed forests in Wisconsin [29] and Ontario [37], though no mechanism of disturbance was reported.

White mulberry occurs in many floodplain or riparian forests prone to flooding [6,16,26,35,36,47,61,75,109]. In central Ohio, white mulberry occurred in riparian bottomland forests experiencing groundwater flooding 1 to several times per year [36]. In central Missouri, white mulberry occurred on floodplain oak-hickory forests where inundation could last as long as 1 week [35]. In streamside forests in central Illinois, white mulberry occurred only at those elevational gradients experiencing flooding in 13% to 25% of years but was not present in areas experiencing more frequent flooding [6].

White mulberry is drought tolerant ([17,64,138], reviews by [30,33]), which may be attributed to its well-developed root system [138]. In the southern high plains of Oklahoma, 32.8% of planted white mulberry survived 7 years of drought [17].

Anthropogenic disturbance: In extreme southern Illinois, white mulberry established following salvage-logging after a tornado in a bottomland hardwood forest. It was not found in undisturbed forest or tornado-impacted areas without salvage logging [114]. In central Arizona, white mulberry was frequent on mesquite (*Prosopis* sp.) terraces characterized as "severely disturbed" following mesquite removal [178]. In southeastern Louisiana, white mulberry

established on elevated spoil banks within the bottomland hardwood forest plant community [170]. White mulberry occurred at low levels on a 15- to 20-year-old revegetating lead and zinc mine spoil site in northeastern Oklahoma [54]. White mulberry established on 5- to 9-year-old revegetating landfill sites in South Korea [80]. White mulberry also established following old field abandonment in New Jersey [112] and southwestern Michigan [45].

**Successional role:** While 1 review suggests that white mulberry has the potential to exclude native vegetation [51], there is little documentation of this impact occurring. White mulberry would most likely alter successional trajectories where it develops in dense thickets, a relatively infrequent establishment pattern. However, on a dredge spoil island in South Carolina, white mulberry established in a thicket so dense that understory vegetation was suppressed [120].

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## FIRE EFFECTS AND MANAGEMENT

**SPECIES:** *Morus alba*

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- [FIRE EFFECTS](#)
- [FUELS AND FIRE REGIMES](#)
- [FIRE MANAGEMENT CONSIDERATIONS](#)

**FIRE EFFECTS:**

**Immediate fire effect on plant:** As of 2009, there was no published information regarding the immediate effects of fire on white mulberry. Because of its thin bark [44], it is likely that white mulberry plants would be top-killed by fire. It is not known whether white mulberry seeds could survive fire, though seeds do have a "hard bony coat" [85] and some may occur deep enough in the soil [84] to avoid lethal temperatures from fire.

**Postfire regeneration strategy [146]:**

Tree with [adventitious](#) buds, a sprouting [root crown](#) and/or [root suckers](#)

[Initial off-site colonizer](#) (off site, initial community)

[Secondary colonizer](#) (on- or off-site seed sources)

**Fire adaptations and plant response to fire:**

- [Fire adaptations](#)
- [Plant response to fire](#)

Fire adaptations: As of 2009, there was little information regarding white mulberry adaptations to fire. Therefore, the information presented here, though based on reported botanical traits, is largely speculative.

The ability of white mulberry to sprout from the stump [150] or roots (reviews by [21,136]) suggests that top-killed white mulberry plants may regenerate vegetatively following fire, though this response has only been documented once, and fire details and the type of sprouting were not specified [161] (see [Plant response to fire](#)). In Oklahoma, most white mulberry lateral roots occurred in the upper 1 to 3 feet (0.3-1 m) of soil [17], a depth at which they would not likely be damaged by fire.

White mulberry seeds present in the soil seed bank may survive fire; in Bronx, New York, viable seeds occurred at a soil depth of 0 to 4 inches (0-10 cm) [84]. Fire would likely have little impact on seeds at the greater depths, and seeds closer to the soil surface may be protected by their "hard bony coat" [85], though no studies have addressed this topic as of 2009. White mulberry's presence in the soil seed bank even when it does not occur in extant vegetation [15,84,125] suggests that white mulberry could establish in a burned area via stored seed even if mature white mulberry was not present in the area prior to fire. White mulberry seeds could be carried long distances by birds

([23,71,113,121,173], review by [30]) or mammals ([71,83], review by [30]) and deposited in burned areas following fire. However, dispersal may not be immediate; white mulberry establishment did not occur in some disturbed areas until other woody species established and provided perches for seed-dispersing birds [45,102,103].

It is not clear whether the high-light conditions existing after fire would favor the establishment of white mulberry, though 1 review states that white mulberry cannot grow in shade [30]. While white mulberry establishes in areas with natural and anthropogenic disturbance [29,37,45,54,80,98,109,112,114,170,178,182] (see [Successional Status](#)), it is not clear what attributes of disturbed areas (e.g., bare mineral soil, high-light conditions, little competition) white mulberry responds to.

**Plant response to fire:** As of this writing (2009), there was only one published study documenting white mulberry's response to fire. Three years after a wildfire in a New Mexico cottonwood riparian forest in the Middle Rio Grande Valley, 8 white mulberry stems were identified as postfire sprouts, though the type of sprout was unspecified [161]. Another study listed white mulberry as a nonnative species capable of sprouting from roots following wildfire in the Middle Rio Grande Valley [136].

#### FUELS AND FIRE REGIMES:

**Fuels:** As of 2009, no studies specifically addressed fuel characteristics of white mulberry. An ornamental white mulberry in Bakersfield, California, had a projected leaf mass per area of crown of 990 g/m<sup>2</sup> [77].

Where white mulberry occurs within the range of red mulberry and exhibits growth patterns similar to those of red mulberry, it is unlikely that local fuel characteristics would be altered. Fuel characteristics could potentially be altered in areas where white mulberry establishes in densities and/or growth patterns differing from those of native vegetation, such as where it develops in dense thickets (e.g., see [120]). It is also possible that white mulberry alters fuel characteristics in areas where post-settlement fire exclusion facilitated the establishment of woody species like white mulberry, as was documented in riparian forests in south-central Nebraska [130] and upland areas adjacent to hardwood gallery forests in the northern Great Plains [81].

**Fire regimes:** It is not known what type of fire regime white mulberry is best adapted to. The current North American distribution of white mulberry includes ecosystems that historically experienced both frequent and infrequent fires of various severities. The impact of white mulberry on these fire regimes is largely unknown. One study suggests that fire exclusion in hardwood gallery forests in the northern Great Plains has facilitated spread of plants like white mulberry out of riparian corridors and into adjacent upland areas with historically high fire frequencies [81].

See the [Fire Regime Table](#) for further information on fire regimes of vegetation communities in which white mulberry may occur.

#### FIRE MANAGEMENT CONSIDERATIONS:

**Preventing postfire establishment and spread:** While there is little documented information regarding the postfire establishment and spread of white mulberry (2009), the potential for vegetative regeneration from stumps [150] and roots (reviews by [21,136]), and the documentation of white mulberry sprouting 3 years following wildfire in New Mexico [161], suggest that managers should monitor top-killed white mulberry plants for any signs of regeneration. White mulberry seeds may survive in the soil seed bank or be dispersed from off-site sources, though it is not clear whether postfire conditions are conducive to white mulberry seed germination and seedling establishment (see [Fire adaptations](#)).

Preventing invasive plants from establishing in weed-free burned areas is the most effective and least costly management method. This may be accomplished through early detection and eradication, careful monitoring and follow-up, and limiting dispersal of invasive plant seed into burned areas. General recommendations for preventing postfire establishment and spread of invasive plants include:

- Incorporate cost of weed prevention and management into fire rehabilitation plans
- Acquire restoration funding
- Include weed prevention education in fire training

- Minimize soil disturbance and vegetation removal during fire suppression and rehabilitation activities
- Minimize the use of retardants that may alter soil nutrient availability, such as those containing nitrogen and phosphorus
- Avoid areas dominated by high priority invasive plants when locating firelines, monitoring camps, staging areas, and helibases
- Clean equipment and vehicles prior to entering burned areas
- Regulate or prevent human and livestock entry into burned areas until desirable site vegetation has recovered sufficiently to resist invasion by undesirable vegetation
- Monitor burned areas and areas of significant disturbance or traffic from management activity
- Detect weeds early and eradicate before vegetative spread and/or seed dispersal
- Eradicate small patches and contain or control large infestations within or adjacent to the burned area
- Reestablish vegetation on bare ground as soon as possible
- Avoid use of fertilizers in postfire rehabilitation and restoration
- Use only certified weed-free seed mixes when revegetation is necessary

For more detailed information on these topics see the following publications: [[4](#),[14](#),[58](#),[162](#)].

**Use of prescribed fire as a control agent:** As of this writing (2009) there were no studies documenting the use of prescribed fire to control white mulberry. Control may be limited by the potential of white mulberry to sprout from the stump [[150](#)] or roots (reviews by [[21](#),[136](#)]). One review suggests that white mulberry roots will continue to produce sprouts even if the plant is cut back every year [[21](#)], suggesting that repeated fires or integrated treatments may be needed to control mature white mulberry.

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## MANAGEMENT CONSIDERATIONS

**SPECIES:** *Morus alba*

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- [FEDERAL LEGAL STATUS](#)
- [OTHER STATUS](#)
- [IMPORTANCE TO WILDLIFE AND LIVESTOCK](#)
- [OTHER USES](#)
- [IMPACTS AND CONTROL](#)

FEDERAL LEGAL STATUS:

None

OTHER STATUS:

Information on state-level noxious weed status of plants in the United States is available at [Plants Database](#).

IMPORTANCE TO WILDLIFE AND LIVESTOCK:

**Palatability and/or nutritional value:** Both the foliage and fruit of white mulberry are edible to livestock and wildlife. White mulberry foliage contains high levels of protein, carbohydrates, fats, fibers, vitamins and minerals (review by [[20](#)]), though a high tannin content may limit its digestibility [[5](#)]. White mulberry foliage from Pakistan contained crude protein ranging from 13.7% to 17.6% of dry mass [[5](#)]. White mulberry foliage was eaten by domestic sheep and goats in Greece (review by [[86](#)]) and was browsed by reintroduced elk in southeastern Kentucky [[133](#)]. Consumption of white mulberry foliage by silkworms is the foundation of the international silk industry ([[44](#),[168](#)], review by [[20](#)]). Grasshoppers defoliated white mulberry foliage in Utah (review by [[106](#)]).

White mulberry fruits from India were high in Vitamin C, and dry samples contained 5.5% protein and 87.55% carbohydrates [[149](#)]. White mulberry fruits are eaten by birds ([[23](#),[71](#),[113](#),[121](#),[173](#)], review by [[30](#)]), red foxes [[83](#)],

northern raccoons, Virginia opossums, squirrels [71], and other mammals (review by [30]).

**Cover value:** White mulberry provides general cover, as well as foraging and nesting habitat, for many bird species. White mulberry is recommended as a shelterbelt tree to improve general wildlife habitat in the Great Plains [66] and to provide vegetative cover for bobwhite quail in northwestern Oklahoma [64]. In a floodplain woodland in southeastern Washington, white mulberry provided important summer foraging habitat for both summer- and permanent-resident birds; birds were observed gleaning insects off of living white mulberry branches and leaves [92].

Shelterbelt white mulberry provided nesting habitat for Mississippi kites in northwestern Oklahoma [94]. Wood thrushes nested in white mulberry in southeastern Pennsylvania [68]. Great blue herons, white ibises, glossy ibises, great egrets, black-crowned night herons, tricolored herons, and yellow-crowned night herons nested in a dense stand of white mulberry on a dredge spoil island in South Carolina [120]. On a coastal island in North Carolina, white mulberry was preferred by nesting great egrets, and also provided nesting habitat for snowy egrets, cattle egrets, little blue herons, and Louisiana herons [101].

#### OTHER USES:

**Silk production:** White mulberry leaves provide the natural food for silkworms. Consequently, white mulberry has been widely planted throughout the world to develop the silk industry ([44,168,173], review by [106]).

**Food value:** White mulberry fruits are edible to humans ([32,116], reviews by [20,30]), though unripened fruit can cause stomach irritation, nervous system stimulation, and hallucinations (review by [30]). Dried white mulberry fruits may be ground up as flour and young shoots may be cooked as a vegetable [38]. White mulberry powder has been used as a preservative for wheat flour (review by [20]).

**Medicinal value:** White mulberry is used for a variety of medicinal purposes. The juice of white mulberry berries is used in the treatment of jaundice and hepatitis in rural areas in Pakistan [1]. It is valued for its antimicrobial properties, antioxidant potential, and in the prevention or treatment of diseases such as diabetes, atherosclerosis, immunonutrition, cancer, neurodegenerative disorders including Alzheimer's disease, and skin disorders (review by [20]). Native Americans used infusions made from white mulberry bark as a laxative, a treatment for dysentery, and a purgative [44].

**Other value:** White mulberry is widely planted as an ornamental shade tree [44,60] or is used in shelterbelts [60,122,143,168]. It has been evaluated for its potential to phytoremediate seleniferous soils in India [31]. White mulberry exhibited low survival and growth after planting on acidic surface-mine soils in Kentucky [118,157]. The leaves of white mulberry are used to make a yellow dye in Turkey [34].

The milky sap of white mulberry is toxic to humans and irritates the skin (review by [30]).

#### IMPACTS AND CONTROL:

##### Impacts:

**Native vegetation:** There is widespread concern over white mulberry's hybridization with the native red mulberry ([18,153,171,174], review by [30]). In Ontario, resulting hybrids were more similar to white mulberry parents, suggesting the potential for a local extinction of red mulberry [18]. In 1963, white mulberry was more common than red mulberry in southeastern Kansas [55]. There is also some concern in the mid-Atlantic region that white mulberry may transmit a harmful root disease to red mulberry [153].

Though it generally grows at relatively low densities, white mulberry has the potential to exclude native vegetation (review by [51]), particularly where it grows in dense thickets. However, as of this writing

(2009) there was little published information documenting this impact. On a dredge spoil island in South Carolina, 95% of a 22.5 acre (9.1 ha) area was covered by a closed-canopy, even-aged stand of white mulberry. No understory was present [120]. White mulberry also established in thickets in limestone areas in north-central Texas [32], though no impact on native vegetation was reported.



White mulberry infestation.  
Photo by Ohio State Weed Lab Archive, The Ohio State University,  
Bugwood.org

White mulberry may have allelopathic properties; in laboratory experiments, white mulberry leaf leachate inhibited the germination of India mustard (*Brassica juncea*) [2].

Other impacts: Spreading white mulberry roots damaged pavement and curbs in San Francisco (review by [33]).

**Control:** In all cases where invasive species are targeted for control, no matter what method is employed, the potential for other invasive species to fill their void must be considered [14]. Control of biotic invasions is most effective when it employs a long-term, ecosystem-wide strategy rather than a tactical approach focused on battling individual invaders [95].

As of this writing (2009), very little information was available regarding control of white mulberry. The potential of white mulberry to sprout from the stump [150], roots (reviews by [21,136]), or from cut stems buried in the soil (review by [30]) may complicate control efforts. Information presented in the following sections may not be comprehensive and is not intended to be prescriptive in nature. It is intended to help managers understand the ecology and control of white mulberry in the context of fire management. For more detailed information on control of white mulberry, consult the references cited here or local extension services.

Fire: For information on the use of prescribed fire to control this species, see [Fire Management Considerations](#).

Prevention: Because white mulberry is often planted as an ornamental, one way to prevent future white mulberry establishment is to avoid planting it. In the mid-Atlantic region, native alternatives to white mulberry include red maple, hackberry, black tupelo, or sassafras [153].

It is commonly argued that the most cost-efficient and effective method of managing invasive species is to prevent their establishment and spread by maintaining "healthy" natural communities [95,135] (e.g., avoid road building in wildlands [160]) and by monitoring several times each year [74]. Managing to maintain the integrity of the native plant community and mitigate the factors enhancing ecosystem invasibility is likely to be more effective than managing solely to control the invader [67].

Weed prevention and control can be incorporated into many types of management plans, including those for logging and site preparation, grazing allotments, recreation management, research projects, road building and maintenance, and fire management [162]. See the [Guide to noxious weed prevention practices](#) [162] for specific guidelines in preventing the spread of weed seeds and propagules under different management conditions.

Cultural control: No information is available on this topic (2009).

Physical or mechanical control: White mulberry seedlings may be controlled by pulling. For larger white mulberry plants, stems may be cut and the stump ground [153]. Girdling is also an option for larger trees ([153], review by [30]). Mechanical control may be limited by the potential of white mulberry to sprout from the stump [150], roots (reviews by [21,136]), or from cut stems buried in the soil (review by [30]). One review suggests that roots will continue to produce sprouts even if the plant is cut back every year [21].

Biological control: Biological control of invasive species has a long history that indicates many factors must be considered before using biological controls. Refer to these sources: [165,176] and the [Weed control methods handbook](#) [159] for background information and important considerations for developing and implementing biological control programs.

As of this writing (2009) there were no biological control programs identified for the control of white mulberry. White mulberry is susceptible to several diseases in North America (review by [137]). In the southern United States, white mulberry may be susceptible to popcorn disease caused by the fungus *Ciboria carunculoides* [59].

Goat browsing was used to suppress white mulberry in prairie remnants in northwest Illinois [8].

Chemical control: Herbicides are effective in gaining initial control of a new invasion or a severe infestation, but they are rarely a complete or long-term solution to weed management [19]. See the [Weed control methods handbook](#) [159] for considerations on the use of herbicides in natural areas and detailed information on specific chemicals.

No detailed information was found describing the use of herbicides to control white mulberry (as of 2009), though 1 review states that herbicides may effectively control white mulberry [30]. One handbook on invasive species in the mid-Atlantic region suggests controlling white mulberry by cutting stems and painting the stump with glyphosate [153].

Integrated management: No information is available on this topic (2009).

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## APPENDIX: FIRE REGIME TABLE

SPECIES: *Morus alba*

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The following table provides fire regime information that may be relevant to white mulberry habitats. Follow the links in the table to documents that provide more detailed information on these fire regimes.

Fire regime information on vegetation communities in which white mulberry may occur. This information is taken from the <a href="#">LANDFIRE Rapid Assessment Vegetation Models</a> [88], which were developed by local experts using available literature, local data, and/or expert opinion. This table summarizes fire regime characteristics for each plant community listed. The PDF file linked from each plant community name describes the model and synthesizes the knowledge available on vegetation composition, structure, and dynamics in that community. Cells are blank where information is not available in the Rapid Assessment Vegetation Model.				
<a href="#">Pacific Northwest</a>	<a href="#">Southwest</a>	<a href="#">Northern Great Plains</a>	<a href="#">Great Lakes</a>	
<a href="#">South-central US</a>	<a href="#">Southern Appalachians</a>	<a href="#">Southeast</a>	<a href="#">Northeast</a>	
<b>Pacific Northwest</b>				
Vegetation Community ( <a href="#">Potential</a> )	Fire	Fire regime characteristics		
		Mean	Minimum	Maximum

<a href="#">Natural Vegetation</a> Group)	severity*	Percent of fires	interval (years)	interval (years)	interval (years)
Northwest Shrubland					
<a href="#">Mountain big sagebrush (cool sagebrush)</a>	Replacement	100%	20	10	40
<b>Southwest</b>					
<ul style="list-style-type: none"> <li>• <a href="#">Southwest Woodland</a></li> <li>• <a href="#">Southwest Forested</a></li> </ul>					
Vegetation Community ( <a href="#">Potential Natural Vegetation</a> Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Southwest Woodland					
<a href="#">Mesquite bosques</a>	Replacement	32%	135		
	Mixed	67%	65		
Southwest Forested					
<a href="#">Riparian forest with conifers</a>	Replacement	100%	435	300	550
<b>Northern Great Plains</b>					
<ul style="list-style-type: none"> <li>• <a href="#">Northern Plains Grassland</a></li> <li>• <a href="#">Northern Plains Woodland</a></li> </ul>					
Vegetation Community ( <a href="#">Potential Natural Vegetation</a> Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Northern Plains Grassland					
<a href="#">Southern mixed-grass prairie</a>	Replacement	100%	9	1	10
<a href="#">Central tallgrass prairie</a>	Replacement	75%	5	3	5
	Mixed	11%	34	1	100
	Surface or low	13%	28	1	50
Northern Plains Woodland					
	Replacement	2%	450		

<a href="#">Oak woodland</a>	Surface or low	98%	7.5		
<a href="#">Great Plains floodplain</a>	Replacement	100%	500		
<b>Great Lakes</b>					
<ul style="list-style-type: none"> <li>• <a href="#">Great Lakes Grassland</a></li> <li>• <a href="#">Great Lakes Woodland</a></li> <li>• <a href="#">Great Lakes Forested</a></li> </ul>					
Vegetation Community ( <a href="#">Potential Natural Vegetation</a> Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
<b>Great Lakes Grassland</b>					
<a href="#">Mosaic of bluestem prairie and oak-hickory</a>	Replacement	79%	5	1	8
	Mixed	2%	260		
	Surface or low	20%	2		33
<b>Great Lakes Woodland</b>					
<a href="#">Northern oak savanna</a>	Replacement	4%	110	50	500
	Mixed	9%	50	15	150
	Surface or low	87%	5	1	20
<b>Great Lakes Forested</b>					
<a href="#">Northern hardwood maple-beech-eastern hemlock</a>	Replacement	60%	>1,000		
	Mixed	40%	>1,000		
<a href="#">Great Lakes floodplain forest</a>	Mixed	7%	833		
	Surface or low	93%	61		
<a href="#">Maple-basswood mesic hardwood forest (Great Lakes)</a>	Replacement	100%	>1,000	≥1,000	>1,000
<a href="#">Oak-hickory</a>	Replacement	13%	66	1	
	Mixed	11%	77	5	
	Surface or low	76%	11	2	25
<a href="#">Pine-oak</a>	Replacement	19%	357		
	Surface or low	81%	85		

## Northeast

- [Northeast Woodland](#)
- [Northeast Forested](#)

Vegetation Community ( <a href="#">Potential Natural Vegetation Group</a> )	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)

### Northeast Woodland

<a href="#">Oak-pine (eastern dry-xeric)</a>	Replacement	4%	185		
	Mixed	7%	110		
	Surface or low	90%	8		

### Northeast Forested

<a href="#">Northern hardwoods-eastern hemlock</a>	Replacement	50%	≥1,000		
	Surface or low	50%	≥1,000		
<a href="#">Appalachian oak forest (dry-mesic)</a>	Replacement	2%	625	500	≥1,000
	Mixed	6%	250	200	500
	Surface or low	92%	15	7	26

## South-central US

- [South-central US Grassland](#)
- [South-central US Shrubland](#)
- [South-central US Woodland](#)
- [South-central US Forested](#)

Vegetation Community ( <a href="#">Potential Natural Vegetation Group</a> )	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)

### South-central US Grassland

<a href="#">Southern tallgrass prairie</a>	Replacement	91%	5		
	Mixed	9%	50		

### South-central US Shrubland

<a href="#">Shinnery oak-mixed grass</a>	Replacement	96%	7		
	Mixed	4%	150		

### South-central US Woodland

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	Replacement	11%	50		
<a href="#">Oak woodland-shrubland-grassland mosaic</a>	Mixed	56%	10		
	Surface or low	33%	17		
<a href="#">Interior Highlands oak-hickory-pine</a>	Replacement	3%	150	100	300
Gibson, David J. 1982. [75203]	Surface or low	97%	4	2	10
South-central US Forested					
	Replacement	2%	190		
<a href="#">Gulf Coastal Plain pine flatwoods</a>	Mixed	3%	170		
	Surface or low	95%	5		
<a href="#">West Gulf Coastal plain pine (uplands and flatwoods)</a>	Replacement	4%	100	50	200
	Mixed	4%	100	50	
	Surface or low	93%	4	4	10
<a href="#">West Gulf Coastal Plain pine-hardwood woodland or forest</a>	Replacement	3%	100	20	200
	Mixed	3%	100	25	
	Surface or low	94%	3	3	5
<a href="#">Southern floodplain</a>	Replacement	42%	140		
	Surface or low	58%	100		
<a href="#">Cross Timbers</a>	Replacement	3%	170		
	Mixed	2%	250		
	Surface or low	94%	6		
<b>Southern Appalachians</b>					
Vegetation Community ( <a href="#">Potential Natural Vegetation</a> Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Southern Appalachians Forested					
	Replacement	25%	435	200	≥1,000
<a href="#">Bottomland hardwood forest</a>	Mixed	24%	455	150	500
	Surface or low	51%	210	50	250
<a href="#">Mixed mesophytic hardwood</a>	Replacement	11%	665		
	Mixed	10%	715		
	Surface or low	79%	90		

	low				
<a href="#">Appalachian oak-hickory-pine</a>	Replacement	3%	180	30	500
	Mixed	8%	65	15	150
	Surface or low	89%	6	3	10
<b>Southeast</b>					
Vegetation Community ( <a href="#">Potential Natural Vegetation</a> Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Southeast Forested					
<a href="#">Maritime forest</a>	Replacement	18%	40		500
	Mixed	2%	310	100	500
	Surface or low	80%	9	3	50
<a href="#">Loess bluff and plain forest</a>	Replacement	7%	476		
	Mixed	9%	385		
	Surface or low	85%	39		
<a href="#">Southern floodplain</a>	Replacement	7%	900		
	Surface or low	93%	63		
*Fire Severities— <b>Replacement:</b> Any fire that causes greater than 75% top removal of a vegetation-fuel type, resulting in general replacement of existing vegetation; may or may not cause a lethal effect on the plants. <b>Mixed:</b> Any fire burning more than 5% of an area that does not qualify as a replacement, surface, or low-severity fire; includes mosaic and other fires that are intermediate in effects. <b>Surface or low:</b> Any fire that causes less than 25% upper layer replacement and/or removal in a vegetation-fuel class but burns 5% or more of the area [ <a href="#">63,87</a> ].					

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