

## ***Fraxinus americana***

## **Oleaceae family**

White ash, Biltmore ash, Biltmore white ash, cane ash, small-seeded white ash

[Description](#)

[Distribution in US](#)

[Images](#)

[Timing of growth](#)

[Phenophases to be monitored for NPN](#)

[Did you know](#)

[Bibliography](#)

[Notes](#)

**Description:** *Fraxinus americana* is a medium to large, long-lived, dioecious, deciduous tree. Trunk is free of branches for most of its length. Flowering initiates before or after leaf emergence, dependent on location. Fruit production begins when the tree is 20 years old or 3-4 in. (8-10 cm) in diameter. Trees can sprout from the root crown following disturbance and/or damage, although sprouting decreases with age. Rarely latent branch/stem bud (epicormic) sprouting will occur.

Variation: Several varieties have been described, but are not currently recognized by all taxonomists. *Fraxinus americana* is a polyploidy species, having different genetic ploidy levels (diploids, tetraploids, hexaploids) occur across its species' distribution. Hybridization with *Fraxinus texensis* has been reported. Many cultivars have been developed in the horticultural trade.

Size: Grows to 40-120 ft. (12.2-36.6 m) tall, occasionally taller; 40-60 ft. (12.2-18.3 m) wide; trunks up to 4-6 ft. (1.2-1.8 m) in diameter.

Leaves: Leaves opposite; odd pinnately compound; petiolate. Leaves are compound; 8-15 in. (20-38 cm) long. Leaflets 5-9, usually 7; ovate to ovate-lanceolate or elliptic; 2-6 in. (5-15.2 cm) long; 1.2-2.4 in. (3-6 cm) wide; entire, sometimes serrulate near apex; apex acuminate to obtuse; upper surface dark green, glabrous; lower surface paler gray to green, glabrous or glabrate or pubescent; petiolule short.

Inflorescence: Inflorescences occur in panicles near terminal ends of branches; axillary. Staminate (male) inflorescence is a cluster of flowers, fascicled. Flowers pedunculate. Pistillate (female) inflorescence is a loose panicle. Flowers pedunculate.

Flowers: Usually male and female flower occur on separate trees (dioecious).

Staminate (male) flowers: Calyx fused, with 4 sepals; calyx tubes 0.04-0.08 in. (1-2 mm) long, persistent; no petals; stamens 2-3.

Pistillate (female) flowers: Calyx fused, with 4 sepals; calyx tubes 0.04-0.08 in. (1-2 mm) long, persistent; no petals; pistil 1; carpels 2; styles 1 per pistil.

Fruit: A samara; one-winged. 0.6-3 in. (1.5-7.6 cm) long; narrow wing extending 1/4-1/3 down cylindrical body of fruit (paddle-shaped); brown to tan to yellow-green; occurring in clusters.

Bark: Its bark is thick, dark gray to ashy gray to dark brown; having a uniform, diamond-shaped ridge and furrow pattern; older trees may be scaly. Branching opposite. Twigs are stout; gray olive green; glabrate or pubescent.

Roots: Roots are a taproot that branches into a few large roots that grow downward. From the vertical roots, single lateral branches develop.

Habitat: *Fraxinus americana* prefers deep, well-drained, moist soils; occurring on middle mesophytic slopes, and slightly elevated ridges in floodplains (in the coastal states) and slopes (in the central states) of major streams. It rarely grows on dry, cold ridges or mountaintops. Its seedlings are shade tolerant, but mature specimens. It is sensitive to some sources of pollution.

**Species distribution in US states:** AL, AR, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, ME, MI, MN, MO, MS, NC, NE, NH, NJ, NY, OH, OK, PA, RI, SC, TN, TX, VA, VT, WI, WV

### Species images:

Whole plant:

<http://www.hort.uconn.edu/Plants/f/fraame/fraame1.html>

Bark:

[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_bark02\\_web400gf.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_bark02_web400gf.jpg)

<http://www.hort.uconn.edu/Plants/f/fraame/fraame1.html>

<http://www.cas.vanderbilt.edu/bioimages/species/frame/fram2.htm>

Leaf:

[http://plants.usda.gov/java/largeImage?imageID=fram2\\_002\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=fram2_002_ahp.tif)

[http://www.ibiblio.org/openkey/intkey/images/Fraxinus\\_americana\\_leaf01.jpg](http://www.ibiblio.org/openkey/intkey/images/Fraxinus_americana_leaf01.jpg)

Leaf underside:

<http://www.duke.edu/~cwcook/trees/fram.html>

<http://www.cas.vanderbilt.edu/bioimages/biohires/f/hfram2-lfmargin-lower12505.JPG>

Colored leaves:

<http://www.hort.uconn.edu/Plants/f/fraame/fraame1.html>

[http://www.wildflower.org/gallery/result.php?id\\_image=22553](http://www.wildflower.org/gallery/result.php?id_image=22553)

Buds:

[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_twig01.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_twig01.jpg)  
<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=46>

Leaf scar (seems to be diagnostic characteristic for this species of ash):

[http://www.ibiblio.org/openkey/intkey/images/Fraxinus\\_americana\\_leaf\\_scar01.jpg](http://www.ibiblio.org/openkey/intkey/images/Fraxinus_americana_leaf_scar01.jpg)  
<http://www.noble.org/WebApps/AppFiles/PlantImageGallery/PlantImages/Woody127-4.jpg>

Staminate (male) flowers:

[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_flowers01.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_flowers01.jpg)  
<http://www.cas.vanderbilt.edu/bioimages/biohires/f/hfram2-flinflor18141.JPG>

Pistillate (female) flowers:

[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_female\\_flr01\\_web400.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_female_flr01_web400.jpg)

Fruit:

[http://plants.usda.gov/java/largeImage?imageID=fram2\\_004\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=fram2_004_ahp.tif)  
[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_fruit02\\_web400gf.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_fruit02_web400gf.jpg)  
[http://www.wildflower.org/gallery/result.php?id\\_image=22556](http://www.wildflower.org/gallery/result.php?id_image=22556)

### **Expected timing of growth stages:**

Flowering: Staminate (male) flowers initiate flowering first. March-May.

Bud swell: April-May.

Bud break: April-May.

Leaf out: \*Need info.

Leaf/canopy development: \*Need info.

Bud formation: \*Need info.

Fruit development: August-October.

Fruit ripening: August-October.

Seed dispersal: August-December, sometimes over the winter.

Leaf coloration: \*Need info.

Leaf fall: \*Need info.

## Phenophases to be monitored for NPN:

### Flowering

*Note: Where possible, observe both male and female flowers and evaluate them separately.*

- *First flower*  
In at least 3 locations on the plant, a flower has opened completely. Flowers are considered ‘opened’ when the reproductive parts are visible between unfolded or opened flower parts. For *Fraxinus americana*, if you know whether the flowers you are observing are male or female, please report this information as well.
- *Full flower [Intensive only]*  
The plant has reached its peak floral display. This occurs when half (50%) of the flowers on the whole plant have opened completely.
- *Last flower*  
The last visible flower has opened completely and is still fresh.

### Leaf out

- *First leaf*  
In at least 3 locations on the plant, the very first green tip of a young leaf has visibly moved out of the leaf bud.

### Leaf elongation

*Note: These measures can be difficult to estimate without a few seasons of practice.*

- *25% leaf elongation [Intensive only]*  
The majority of young leaves have unfolded completely and have expanded to one-quarter (25%) of their mature size. Leaf elongation may also be estimated by viewing the canopy as a whole. At 25% leaf elongation, the canopy appears to be approximately one-quarter (25%) full.
- *50% leaf elongation [Intensive only]*  
The majority of young leaves have unfolded completely and have expanded to half (50%) of their mature size. Leaf elongation may also be estimated by viewing the canopy as a whole. At 50% leaf elongation, the canopy appears to be approximately half (50%) full.

- *75% leaf elongation*  
The majority of young leaves have unfolded completely and have expanded to three-quarters (75%) of their mature size. Leaf elongation may also be estimated by viewing the canopy as a whole. At 75% leaf elongation, the canopy appears to be approximately three-quarters (75%) full.
- *Full leaf elongation [Intensive only]*  
The majority of young leaves have unfolded completely and have expanded to 95-100% of their mature size. At full leaf elongation, the canopy appears to have reached its full density.

### **Fruit ripening**

- *First fruit ripe*  
In at least 3 locations on the plant, a fruit has become ripe. In *Fraxinus americana*, a good test for ripeness is fruit drop; ripe samaras will easily fall into your hand when touched or gently handled. Ripeness may also be indicated by the presence of at least 3 samaras on the ground below the plant (that are not apparently from a nearby tree). (Note that *Fraxinus americana* individuals with only male flowers will not produce fruit.)
- *50% of fruit ripe [Intensive only]*  
For the whole plant, half (50%) of the fruits are ripe. In *Fraxinus americana*, this occurs when half (50%) of the samaras have dropped.
- *All fruit ripe [Intensive only]*  
For the whole plant, virtually all (95-100%) of the fruits are ripe. In *Fraxinus americana*, this occurs when all (95-100%) of the samaras have dropped.

### **Leaf color change**

***Note: If drought seems to be the cause of leaf color change for a plant, please make a comment about it for that plant.***

- *First leaf colored [Intensive only]*  
In at least 3 locations on the plant, the green leaves have begun to change to their late season colors.
- *25% of leaves colored [Intensive only]*  
For the whole plant, one-quarter (25%) of the leaves (including any that have fallen to the ground) have changed to their late season colors.

- *50% of leaves colored*  
For the whole plant, half (50%) of the leaves (including any that have fallen to the ground) have changed to their late season colors.
- *75% of leaves colored [Intensive only]*  
For the whole plant, three-quarters (75%) of the leaves (including any that have fallen to the ground) have changed to their late season colors.
- *All leaves colored*  
For the whole plant, virtually all (95-100%) of the leaves (including any that have fallen to the ground) have changed to their late season colors and there is virtually no green left in the leaves.

### **Leaf fall**

***Note: If drought seems to be the cause of leaf fall for a plant, please make a comment about it for that plant.***

- *First leaf fallen [Intensive only]*  
In at least 3 locations on the plant, a leaf easily falls off into your hand when touched or gently handled. First leaf fallen may also be indicated by the presence of at least 3 leaves on the ground below the plant (that are not apparently from another individual nearby).
- *25% of leaves fallen [Intensive only]*  
For the whole plant, one-quarter (25%) of the leaves have fallen.
- *50% of leaves fallen*  
For the whole plant, half (50%) of the leaves have fallen.
- *75% of leaves fallen [Intensive only]*  
For the whole plant, three-quarters (75%) of the leaves have fallen.
- *All leaves fallen*  
For the whole plant, virtually all (95-100%) of the leaves have fallen.

**Did you know?** *Fraxinus americana* is a valuable resource; it is used because of its strength, hardness, heaviness, and elasticity/shock resistance. It is used for furnishings, furniture, posts, railroad cars and ties, boats, tool handles, canoe paddles, snowshoes, wooden baseball bats, and fuel. It was used by Native Americans for tools and utensils, and medicinally for many symptoms. It is used in several states on reclaimed coal mine sites. Many wild and domestic animals and birds use it for browse and cover, and its seeds and bark are used for food.

## Bibliography:

Griffith, Randy Scott. 1991. *Fraxinus americana*. 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/>; accessed 3/6/08:  
<http://www.fs.fed.us/database/feis/plants/tree/fraame/all.html>.

Nesom, G. Unknown date. White ash, *Fraxinus americana*. USDA NRCS National Plant Data Center. Baton Rouge, LA. [http://plants.usda.gov/plantguide/doc/cs\\_fram2.doc](http://plants.usda.gov/plantguide/doc/cs_fram2.doc) ; accessed 3/6/08.

OpenKey, Illinois - North Carolina Collaborative Environment for Botanical Resources; accessed 3/6/08  
<http://www.ibiblio.org/openkey/intkey/web/FRAM2.htm>

680 Tree Fact Sheets, University of Florida; accessed 3/6/08  
<http://hort.ufl.edu/trees/FRAAMEA.pdf>

USDA Forest Service, Silvics of North America, Vol. 2, Hardwoods; accessed 3/6/08  
[http://www.na.fs.fed.us/spfo/pubs/silvics\\_manual/volume\\_2/fraxinus/americana.htm](http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/fraxinus/americana.htm)

USDA Plants Database; accessed 3/6/08  
<http://plants.usda.gov/>

Virginia Tech, Department of Forestry, College of Natural Resources; accessed 3/6/08  
<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=46>

images:

Bioimages; accessed 3/6/08  
<http://www.cas.vanderbilt.edu/bioimages/species/frame/fram2.htm>  
<http://www.cas.vanderbilt.edu/bioimages/biohires/f/hfram2-flinflor18141.JPG>  
<http://www.cas.vanderbilt.edu/bioimages/biohires/f/hfram2-lfmargin-lower12505.JPG>

Cofrin Center for Biodiversity, Herbarium, University of Wisconsin, Green Bay; accessed 3/6/08  
<http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame01.htm>  
[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_flowers01.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_flowers01.jpg)  
[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_female\\_flr01\\_web400g.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_female_flr01_web400g.jpg)  
[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_fruit02\\_web400gf.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_fruit02_web400gf.jpg)  
<http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame Twig01.jpg>  
[http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame\\_bark02\\_web400gf.jpg](http://www.uwgb.edu/BIODIVERSITY/herbarium/trees/fraame_bark02_web400gf.jpg)

USA-NPN Plant Phenology Protocol, *Fraxinus americana*\_v1.0(beta).doc

The Samuel Roberts Noble Foundation, The Noble Foundation Plant Image Gallery; accessed 3/6/08  
<http://www.noble.org/WebApps/AppFiles/PlantImageGallery/PlantImages/Woody127-4.jpg>

Trees, Shrubs, and Woody Vines of North Carolina, Will Cook's Web Site; accessed 3/6/08  
<http://www.duke.edu/~cwcook/trees/fram.html>

UConn Plant Database of trees, shrubs, and vines; accessed 3/6/08  
<http://www.hort.uconn.edu/Plants/f/fraame/fraame1.html>

University of Texas at Austin, Lady Bird Johnson Wildflower Center; accessed 3/6/08  
[http://www.wildflower.org/gallery/result.php?id\\_image=22556](http://www.wildflower.org/gallery/result.php?id_image=22556)  
[http://www.wildflower.org/gallery/result.php?id\\_image=22553](http://www.wildflower.org/gallery/result.php?id_image=22553)

USDA Plants Database; accessed 3/6/08  
[http://plants.usda.gov/java/largeImage?imageID=fram2\\_004\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=fram2_004_ahp.tif)  
[http://plants.usda.gov/java/largeImage?imageID=fram2\\_002\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=fram2_002_ahp.tif)

Virginia Tech, Department of Forestry, College of Natural Resources; accessed 3/6/08  
<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=46>  
[http://www.ibiblio.org/openkey/intkey/images/Fraxinus\\_americana\\_leaf01.jpg](http://www.ibiblio.org/openkey/intkey/images/Fraxinus_americana_leaf01.jpg)  
[http://www.ibiblio.org/openkey/intkey/images/Fraxinus\\_americana\\_leaf\\_scar01.jpg](http://www.ibiblio.org/openkey/intkey/images/Fraxinus_americana_leaf_scar01.jpg)

## Notes

The USDA PLANTS symbol for this plant is FRAM2.  
The ITIS Taxonomic Serial No. for this species is 32931.

BBCH codes for phenophases used for this plant are available from the USA-NPN office upon request.

Proposed modifications, updates or corrections to this protocol are welcome; please direct correspondence to the USA-NPN National Coordinating Office.

Prior versions of this species protocol will be made available in a documents library on USA-NPN webpage.

**Document history:** v1.0 (beta); 05/19/08

**Protocol compiler:** Patty Guertin

**Reviewers:** Ellen Denny

USA National Phenology Network

USA-NPN Plant Phenology Protocol, *Fraxinus\_americana\_v1.0(beta).doc*

National Coordinating Office  
1955 East 6th Street  
Tucson, AZ 85719  
[www.usanpn.org](http://www.usanpn.org)