

## ***Carya glabra***

## **Juglandaceae family**

Pignut hickory, hairy pignut hickory, sweet pignut, coast pignut hickory, smoothbark hickory, swamp hickory, broom hickory, red hickory, pignut, false shagbark

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**Description:** *Carya glabra* is a medium to large, slow to moderate-growing, long-lived, monoecious, deciduous tree. Flowers appear after budburst. Male flowers develop before female flowers. Reproduction occurs by seed or vegetatively. Plants mature at about 30 years of age. Trees typically sprout readily from their stumps / root crown or stem base and roots following disturbance and/or damage.

Variation: *Carya glabra* has three recognized varieties, with a fourth in some taxonomic systems. Some taxonomists consider this species in a complex with *Carya ovalis*. *Carya glabra* hybridizes with *Carya cordiformis* (butternut hickory).

Size: Grows 50-100 ft. (15-30 m) tall or more; 20-40 ft. (6-12 m) wide; up to 12-48 in. (30-122 cm) in diameter.

Leaves: Leaves alternate; odd once-pinnately compound. Leaf blade/lamina 6-24 in. (15-60 cm) long; 5 leaflets, occasionally 3, 7 or 9; terminal leaflet as large or slightly larger than upper lateral leaflets, lower lateral leaflets usually much smaller than upper lateral leaflets; petiole 1.2-5.5 in. (3-14 cm) long; petiole and rachis glabrous. Leaflets lanceolate to oblanceolate to obovate; 1.2-9 in. (3-22.5 cm) long, 0.7-5 in. (1.8-13 cm) wide; margins finely to coarsely serrate; apex acuminate or acute; venation pinnate; upper surface green to yellow-green, glabrous to glabrate; lower surface green, glabrous to densely hairy, and/or with tufts of hairs; lateral leaflets sessile to subsessile, terminal leaflet with short petiolule, 0.2-0.5 in. (0.6-1.3 cm) long.

Inflorescence:

Staminate (male) inflorescence: Staminate flowers in short-peduncled pendulous catkins/aments, catkins grouped 1-3; 2-7 in. (5-18 cm) long; yellow-green; flowers subtended by linear acuminate bract, bract villose and much longer than calyx lobes. From the axils of leave of the previous season or from old wood at the base of current growth in the inner scales of the terminal buds.

Pistillate (female) inflorescence: Pistillate flowers in short, 0.25 in. (0.6 cm) long, terminal 1-5 flowered spikes, flowers tomentose. From peduncles terminating shoots of the current year's growth.

Flowers: Monoecious (separate male and female flowers occurring on same plant).

Flower calyx present, corolla absent.

Staminate (male) flowers: Stamens 4, rarely 6.

Pistillate (female) flowers: Ovary inferior; pistil 1; carpels 2.

Fruit: A nut. Fruit 0.7-2 in. (1.8-5 cm) in diameter; obovoid, compressed, rounded at apex, dark brown when mature. Husk 0.08-0.2 in. (0.2-0.5 cm) thick; husk often splits into sections along sutures (1-4 splits) when fruit mature. Nut 0.6-1.4 in. (1.5-3.5 cm) long, obovoid, compressed, rounded at apex; shell hard, thick; seed small.

Bark: Initially smooth and light gray. Mature bark is light gray to gray-brown, ridged and furrowed, with flattened diamond shaped scales, occasionally with small exfoliating scales. Twigs glabrous.

Roots: Tends to develop a pronounced taproot with a few lateral roots.

Habitat: *Carya glabra* grows on xeric to mesic mixed woodlands, mixed forest edges, hillsides and ridges, bottomland forests, wet hummocks, and stable dunes. It grows in humid climates. It grows best on light, well-drained, loamy soils. It is tolerant of shade in its southern distribution.

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

### Species images:

Whole plant:

[http://www.floridata.com/ref/C/cary\\_gla.cfm](http://www.floridata.com/ref/C/cary_gla.cfm)

<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=19>

Bark:

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-brlarge16349.JPG>

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

<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=19>

Leaf:

[http://plants.usda.gov/java/largeImage?imageID=cagl8\\_001\\_avp.tif](http://plants.usda.gov/java/largeImage?imageID=cagl8_001_avp.tif)

<http://www.forestryimages.org/images/768x512/2130049.jpg>

[http://www.ibiblio.org/openkey/intkey/images/Carya\\_glabra\\_leaf01.jpg](http://www.ibiblio.org/openkey/intkey/images/Carya_glabra_leaf01.jpg)

leaf margins:

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-lfmargin28725.JPG>

Leaf underside:

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-lfmargin-uplow30205.JPG>

Colored leaves:

<http://www.cnr.vt.edu/DENDRO/DENDROLOGY/fall/cglabra.jpg>

<http://www.museum.state.il.us/muslink/forest/htmls/trees/C-glabra.html>

Buds:

<http://www.forestryimages.org/images/768x512/2130048.jpg>

[http://www.ibiblio.org/openkey/intkey/images/Carya\\_glabra\\_buds02.jpg](http://www.ibiblio.org/openkey/intkey/images/Carya_glabra_buds02.jpg)

<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=19>

Inflorescence:

Staminate (male) inflorescence:

<http://www.forestryimages.org/images/768x512/1380300.jpg>

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-flmale51435.JPG>

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

Pistillate (female) inflorescence: \*Need photo.

Staminate (male) flowers: \*Need photo.

Pistillate (female) flowers: \*Need photo.

Fruit:

mature:

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-frside16372.JPG>

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-frend16376.JPG>

<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=19>

nut:

[http://plants.usda.gov/java/largeImage?imageID=cagl8\\_003\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=cagl8_003_ahp.tif)

<http://www.cas.vanderbilt.edu/bioimages/biohires/c/hcagl8-frnut16380.JPG>

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

Flowering: Mid-March-late June, depending on location. Mid-March in its southeastern distribution to early June in New England.

Bud swell: \*Need info.

Bud break: \*Need info.

Leaf out: \*Need info.

Leaf/canopy development: \*Need info.

Bud formation: \*Need info.

Fruit development: \*Need info.

Fruit ripening: September-October.

Seed dispersal: September-December.

Leaf coloration: \*Need info.

Leaf fall: \*Need info.

### **Phenophases to be monitored for NPN:**

#### **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.

#### **Flowering**

- *First pollen released* **[Intensive only]**  
In at least 3 locations on the plant, pollen is released from a flower when gently shaken or blown. For *Carya glabra*, the male flowers from which pollen is released are arranged on catkins. Where catkins are out of reach, pollen release may be estimated by observing the degree of catkin elongation and looseness. Once the initially compact catkins have unfolded and are hanging loosely, pollen will be released.

#### **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 *Carya glabra*, a fruit is considered ripe when the husk turns dark brown and splits open to release the nut inside. Ripeness may also be indicated by the presence of at least 3 fresh hickory nuts on the ground below the plant (that are not apparently from a nearby tree).
- *50% of fruit ripe [Intensive only]*  
For the whole plant, half (50%) of the fruits are ripe. In *Carya glabra*, this occurs when half (50%) of the fruits have split to release the nut.
- *All fruit ripe [Intensive only]*  
For the whole plant, virtually all (95-100%) of the fruits are ripe. In *Carya glabra*, this occurs when all (95-100%) of the fruits have split to release the nut.

### **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?** *Carya glabra* leaves and fruits are an important food for many animals. The wood is used for fuel, and a variety of products (broomhandles, skis, wagon wheels, early automobile parts, sporting goods, agricultural implements, tool handles, shuttle blocks, mallets, and mauls).

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### Notes

The USDA PLANTS symbol for this plant is CAGL8.

The ITIS Taxonomic Serial No. for this species is 19231.

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.

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