

Liriodendron tulipifera

Magnoliaceae family

Tuliptree, tulip poplar, yellow poplar, white poplar, American whitewood, whitewood, poplar, basswood, blue poplar, canarywood, canoewood, cucumbertree, hickory poplar, popple, saddle-tree, sap poplar, tulipwood

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Description: *Liriodendron tulipifera* is a rapid- to moderate growth, long-lived, deciduous tree. Flowering occurs after leaf emergence. Flowers are insect pollinated; some self-pollination occurs. Plants mature and become reproductive at 15-20 years of age. Reproduction is by seed and vegetatively. Plants will sprout from the root crown following disturbance and damage; sprouting decreases with age.

Variation: *Liriodendron tulipifera* has no recognized variation in some taxonomic systems and several varieties and forms in others. Cultivars have been developed in the horticultural trade.

Size: Grows 80-160 ft. (24-50 m) tall or more; 20-50 ft (6-15 m) wide. Its trunk can be 2-5 ft. (0.6-1.5 m) in diameter or more.

Leaves: Leaves alternate, simple, entire, petiolate; stipulate. Leaf blade/lamina is broadly ovate to orbiculate, 2.4-9.2 in. (6-23.5 cm) long, 2.4-10 in. (6-25.5 cm) wide, sinuately 4-lobed, rarely with more lobes, margins entire, pinnately veined; upper surface dark green, shiny, glabrous; lower surface paler, pubescent to puberulent; petiole angled, 2-6 in. (5-15.2 cm) long. Stipules large, encircle the twig, tardily deciduous to persistent.

Inflorescence: Flowers solitary, terminal.

Flowers: Flowers perfect, cup-shaped, 2-5 in. (5-12.7 cm) wide, 1-2 in. (2.5-5 cm) deep; pedicellate. Sepals 3, ovate-lanceolate, concave, greenish white to green, reflexed; petals 6, 1.5-2.4 in. (3.7-6 cm) long, 0.7-1.2 in. (1.8-3 cm) wide, erect, light-greenish to yellow with orange markings; stamens numerous (20-50); pistils many (60-100), each with 1 carpel, style 1, stigma 1; pistils imbricate on elongated spindle-shaped receptacle. Pedicels 0.7-1 in. (2-2.5 cm) long.

Fruit: A samara, on a cone-shaped aggregate of samaras; samaras imbricate along elongate spindle-shaped receptacle, 0.5-3.4 in. (1.3-8.5 cm) long, about 0.5 in. (1.3 cm) wide, light brown to brown; samara winged.

Bark: Bark on young trees smooth, light gray-green to light ashy-gray, with very shallow, longitudinal, whitish furrows; with age the interlacing furrows are deep with narrow rounded ridges. Twigs are yellow-green to olive-brown to reddish-brown to brown or gray, glabrous.

Roots: *Need info.

Habitat: *Liriodendron tulipifera* grows on moderately moist, deep, well-drained, loose-textured soils, along streams, bottom lands, and moist slopes; rare on dry or wet sites. Seedlings intolerant of shade. The species is sensitive to high ozone concentrations.

Species distribution:

AL, AR, CT, DC, DE, FL, GA, IL, IN, KY, LA, MA, MI, MO, MS, NC, NJ, NY, OH, PA, RI, SC, TN, TX, VA, VT, WV

Species images:

Whole plant:

http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0105+0459

<http://www.forestryimages.org/images/768x512/1380466.jpg>

seedling: http://plants.usda.gov/java/largeImage?imageID=litu_014_ahp.jpg

Bark:

<http://www.forestryimages.org/images/768x512/1119409.jpg>

older: <http://www.cas.vanderbilt.edu/bioimages/biohires/l/hlitu--brlarge-tree11275.JPG>

<http://www.forestryimages.org/images/768x512/1342132.jpg>

<http://www.forestryimages.org/images/768x512/1116123.jpg>

Leaf:

http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0105+1971

<http://www.forestryimages.org/images/768x512/0008444.jpg>

stipules evident: <http://www.cas.vanderbilt.edu/bioimages/biohires/l/hlitu--lfstipulesb5174.jpg>

http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0105+0460

http://www.ibiblio.org/openkey/intkey/images/Liriodendron_tulipifera_leaves01.jpg

Colored leaves:

http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/liriodendron_tulipifera.html

http://web.syr.edu/~dmmuska/L/Liriodendron_tulipifera.html

Buds:

<http://www.cas.vanderbilt.edu/bioimages/biohires/l/hlitu--tw17275.JPG>

<http://www.forestryimages.org/images/768x512/1119411.jpg>

flower: <http://www.forestryimages.org/images/768x512/0008148.jpg>

Flowers:

http://www.uvawise.edu/natural_sciences/localflora/Liriodendron_tulipifera.html

<http://www.forestryimages.org/images/768x512/2146042.jpg>

profile view, with sepals:

http://plants.usda.gov/java/largeImage?imageID=litu_015_avp.jpg

Fruit:

developing: <http://www.cas.vanderbilt.edu/bioimages/biohires/l/hlitu--frdevel16111.JPG>

<http://www.forestryimages.org/images/768x512/0008275.jpg>

mature: http://plants.usda.gov/java/largeImage?imageID=litu_010_avp.tif

<http://www.cas.vanderbilt.edu/bioimages/biohires/l/hlitu--frclose17019.JPG>

Seeds:

http://plants.usda.gov/java/largeImage?imageID=litu_011_ahp.tif

Expected timing of growth stages:

Bud break/Leaf out: *Need info.

Flowering: March to mid-July, depending on location.

Leaf/canopy development: *Need info.

Fruiting ripening: August-October, depending on location.

Seed dispersion: October-November, and some as late as March.

Leaf color: *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 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.
- *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 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 *Liriodendron tulipifera*, a samara is considered ripe when it has turned brown and separates from its cone-shaped cluster. 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).
- *50% of fruit ripe [Intensive only]*
For the whole plant, half (50%) of the fruits are ripe. In *Liriodendron tulipifera*, this occurs when half (50%) of the samaras have separated.
- *All fruit ripe [Intensive only]*
For the whole plant, virtually all (95-100%) of the fruits are ripe. In *Liriodendron tulipifera*, this occurs when all (95-100%) of the samaras have separated.

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? *Liriodendron tulipifera* is used for pulpwood, cabinets and furniture, musical instruments, toys, gunstocks, sporting goods, veneer, particle board and plywood; historically was used for carriage bodies, shingles, saddle frames, and woodenware. It has been used medicinally.

Bibliography:

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Notes

The USDA PLANTS symbol for this plant is LITU.
The ITIS Taxonomic Serial No. for this species is 18086.

BBCH codes for phenophases used for these plants 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) 08/20/08

Protocol compiler: Patty Guertin, Lisa Benton

Reviewers: Ellen Denny

USA National Phenology Network
National Coordinating Office
1955 East 6th Street
Tucson, AZ 85719
www.usanpn.org