Cercis canadensis Fabaceae family

Eastern redbud, redbud, Judas tree, western redbud, Mexican redbud, Canadian redbud

Description: *Cercis canadensis* is a short-lived, deciduous shrub to small tree. Flowering usually occurs before budburst. Flowers are cross- and self-pollinated; cross pollination occurs by insects. Reproduction is by seed and vegetatively. Plants can flower less than 7 years old, but do not fruit the first year of blooming. Trees sprout from the root crown or roots following disturbance and/or damage.

Variation: *Cercis canadensis* has several recognized varieties. Cultivars have been developed in the horticultural trade.

Size: Grows 16-40 ft. (5-12 m) tall, or more; 25-35 ft. (7.6-10.7 m) wide.

Leaves: Leaves alternate, simple, petiolate; stipules present, caducous; leaves emerge bright green tinged red and mature to dark green. Leaf blade/lamina broad, cordate or orbiculate or ovate or reniform; 2-6 in. (5-15 cm) long; 1.2-6 in. (3-15 cm) wide; margins entire; apex acuminate or acute or obtuse; venation palmate, with 5-9 prominent radiating veins; upper surface blue-green to green, glabrous or glabrate; lower surface paler green, glabrous to pubescent; petiole 1.6-5.2 in. (4-13 cm) long, swollen at both ends. At the point where the petiole and leaf blade/lamina join a pulvinus occurs (small angled extension).

Inflorescence: Inflorescence axillary; fascicles or simple umbels; flowers pediceled. Flowers clustered, 2-8, primarily on older stems.

Flowers: Flowers perfect, bilaterally symmetric, pedicel 0.3-0.5 in. (0.8-1.3 cm) long; calyx tube 0.07-0.1 in. (0.2-0.3 cm) long, sepal lobes 5, purple to red or rose; corolla pink to purple or white, 0.3-0.5 in. (0.9-1.2 cm) long, petals 5, nearly equal; stamens 10, in two rows; pistil 1; carpel 1; style 1; ovules two-ranked.

Fruit: A legume/pod; thin, flat, 1.5-4 in. (4-10 cm) long, 0.3-0.7 in. (0.8-1.8 cm) broad; green or purplish immature, brown to black when mature. Seeds 4-10; flat, elliptical, brown, shiny; 0.2-0.3 in. (0.5-0.8 cm) long.

Bark: Initially the bark is smooth, brown. Mature bark scaly gray-brown to dark brown shallowly furrowed and ridged to sometimes flaky showing orangish inner bark. Twigs glabrous, nearly black, spotted with lighter lenticels. Stem bark reddish-brown to dark brown. Stems have a zig-zag growth pattern.

Roots: Plants develop a deep taproot, with secondary roots developing when the taproot is 2-3 in. (5-8 cm) long and growing rapidly. The roots are long and coarse.

Habitat: *Cercis canadensis* is found on sites xeric to mesic but grows better on moist well-drained sites. It grows on a variety of soils but is not found on coarse sands. It occurs in dry-mesic to mesic upland forests, forest understory in moist, rich woods, stream banks, in ravines, on bluffs, in open rocky woods, mixed forest edges, in brushy arroyos, canyons, suburban plantings and abandoned farmland.

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

Species images:

Whole plant:
flowering:
http://www.kswildflower.org/largePhotos.php?imageID=40&aCategory=f&lastModified=2007-06-29
http://www.forestryimages.org/images/768x512/0008138.jpg
http://www.forestryimages.org/images/768x512/2189072.jpg
in leaf:
http://www.noble.org/WebApps/AppFiles/PlantImageGallery/PlantImages/Woody85-2.jpg

Bark:
http://www.forestryimages.org/images/768x512/0008050.jpg
http://www.cas.vanderbilt.edu/bioimages/biohires/c/hceca4-br11227.JPG
http://ontariotrees.com/main/species.php?id=2074
http://www.duke.edu/~cwcook/trees/ceca.html

Leaf:
http://www.forestryimages.org/images/768x512/0008425.jpg
http://www.duke.edu/~cwcook/trees/ceca.html
http://www.ibiblio.org/openkey/intkey/images/Cercis_canadensis_leaves03.jpg
http://www.sbs.utexas.edu/bio406d/images/pics/fab/cercis_canadensis.htm
branching:
http://www.forestryimages.org/images/768x512/1330060.jpg
pulvinus at leaf base:
http://www.ibiblio.org/openkey/intkey/images/Cercis_canadensis_pulvinus02.jpg

Leaf underside:
http://www.cas.vanderbilt.edu/bioimages/biohires/c/hceca4-lfmargin-uplow15395.JPG

Budburst:
http://www.plantsystematics.org/imgs/kcn2/r/Fabaceae_Cercis_canadensis_12820.html
leaf expansion:
http://www.forestryimages.org/images/768x512/1331007.jpg

Colored leaves:
http://www.forestryimages.org/images/768x512/1480092.jpg
http://www.forestryimages.org/images/768x512/1480097.jpg

Buds:
http://www.forestryimages.org/images/768x512/0008535.jpg
http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=43
flowers:
http://www.forestryimages.org/images/768x512/0008133.jpg
http://www.forestryimages.org/images/768x512/5141048.jpg

Flowers:
http://biology.missouristate.edu/Herbarium/Plants%20of%20the%20Interior%20Highlands/Flowers/Cercis%20canadensis%20-%204.jpg
http://botany.cs.tamu.edu/FLORA/swts/faba003.jpg
http://www.missouriplants.com/Pinkalt/Cercis_canadensis_page.html

Fruit:
immature:
http://www.ag.auburn.edu/hort/landscape/dbpages/303.html
http://www.forestryimages.org/images/768x512/0008267.jpg
mature:
http://www.plantsystematics.org/imgs/dws/r/Fabaceae_Cercis_canadensis_16845.html
http://www.forestryimages.org/images/768x512/1346084.jpg
http://www.forestryimages.org/images/768x512/1346085.jpg
seeds:
http://plants.usda.gov/java/largeImage?imageID=ceca4_009_ahp.tif

Expected timing of growth stages:

Annual cambial growth: Begins just before flowering.

Shoot growth: Begins during flowering.

Flowering: February-May, depending on location.

Bud swell: *Need info.

Bud break: Generally following flowering. *Need info.

Leaf out: *Need info.

Leaf/canopy development: *Need info.

Bud formation: *Need info.

Fruit development: Fully developed end of May, southern distributions.

Fruit ripening: September-October.

Seed dispersal: Fall and winter.

Leaf coloration: *Need info.

Leaf fall: *Need info.

Phenophases to be monitored for NPN:

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 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. For *Cercis canadensis*, a fruit is considered ripe when the seedpod has turned dark brown in color.

- *50% of fruit ripe* **[Intensive only]**
  For the whole plant, half (50%) of the fruits are ripe.

- *All fruit ripe* **[Intensive only]**
  For the whole plant, virtually all (95-100%) of the fruits are ripe.

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? *Cercis canadensis* is used medicinally, and the flowers are eaten, used in salads, fried, and pickled.

Bibliography:

OpenKey, Illinois - North Carolina Collaborative Environment for Botanical Resources; accessed 7/1/08: http://www.ibiblio.org/openkey/intkey/web/CECA4.htm

Sargent, C.S. 1965. Manual of the trees of North America, Vol. I. Dover Publications, Inc. 452 pp.

680 Tree Fact Sheets, University of Florida; accessed 7/1/08: http://hort.ufl.edu/trees/CERCANA.pdf

Sullivan, Janet. 1994. Cercis canadensis. 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 7/1/08: http://www.fs.fed.us/database/feis/plants/tree/cercan/all.html

UConn Plant Database of trees, shrubs, and vines; accessed 7/1/08: http://www.hort.uconn.edu/Plants/c/cercan/cercan1.html

USDA Forest Service, Silvics of North America, Vol. 2, Hardwoods; accessed 7/1/08: http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/cercis/canadensis.htm

USDA, NRCS, Plant Guide, Eastern redbud, *Cercis canadensis* L.; accessed 7/1/08: http://plants.usda.gov/plantguide/pdf/cs_ceca4.pdf

USDA Plants Database; accessed 7/1/08: http://plants.usda.gov/

Virginia Tech, Department of Forestry, College of Natural Resources; accessed 7/1/08: http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=43

Notes
The USDA PLANTS symbol for this plant is CECA4.
The ITIS Taxonomic Serial No. for this species is 25782.

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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