

## ***Corylus cornuta***

## **Betulaceae family**

Beaked hazelnut, beaked hazel, California hazelnut, California filbert, California hazel

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**Description:** *Corylus cornuta* is a multi-stemmed, monoecious (male and female flowers separate on same plant) and rarely dioecious (male and female flowers on separate plants), rhizomatous (although var. *californica* usually not), deciduous shrub to a small tree. Flowering occurs before leaf emergence. Flowers are wind pollinated. It is primarily self-incompatible, requiring cross pollination, although *Corylus cornuta* var. *californica* reportedly self-pollinates. Reproduction is by seed and vegetatively; vegetative reproduction is more common. Plants sprout from the root crown, from rhizomes, and by layering; disturbance and damage can initiate sprouting (var. *californica* generally sprouts from the root crown, rarely from rhizomes). It can be thicket-forming, from rhizomes (clonal); rhizomes are not developed until a plant is 7-12 years old. In its northern distribution generally saplings rarely flower and are top-killed, then resprout; one year old sprouts will produce male flowers, and two year old sprouts will also produce female flowers. One source states plants can live about 60 years; sources report that on northern sites aerial stems of clonal plants have a lifespan about 18-21 years, although the rhizomes may be older. One study of *Corylus cornuta* growth stages showed that six year-old clones supported 2-3 sprouts, 38 year-old clones averaged 25 stems.

Variation: *Corylus cornuta* has several recognized varieties, with slight overlap of their distributions. *Corylus cornuta* var. *cornuta* and *Corylus cornuta* var. *californica* hybridize and introgress where their distributions overlap; *Corylus cornuta* var. *cornuta* also hybridizes with *Corylus americana* (American hazelnut).

Size: Grows 3-49 ft. (1-15 m) tall.

Leaves: Leaves alternate; simple, petiolate. Leaf blade/lamina nearly orbiculate to narrowly ovate or ovate-oblong; 1.6-4 in. (4-10 cm) long; 0.8-4.7 in. (2-12 cm) wide; margins coarsely, often irregularly, doubly serrate; apex acute to acuminate, often nearly angular and lightly lobed; upper surface dark green, slightly pubescent; lower surface glabrous to moderately pubescent; petiole 0.2-0.4 in. (0.5-1 cm) long, glabrous to moderately pubescent with or without glandular hairs.

Inflorescence: Staminate (male) and pistillate (female) flowers in separate inflorescences, on the same plant.

Staminate (male) inflorescence: A pendulous catkin/ament 0.9-2.4 in. (2.4-6 cm) long; clustered, 2-3, on short shoots of branchlets; yellow-brown; 3 flowers per subtending bract; flowers arranged spirally;

Pistillate (female) inflorescence: Small, ovoid; several flowers in a gray-brown scaly bud; flowers subtended and surrounded by two leafy, coarsely toothed, prickly-haired bracts, bracts fused at tip and forming an extended tubular beak, beak less than 2 times the length of the nuts. Clustered (2-6) at terminal end of short branches.

Flowers:

Staminate (male) flowers: Sepals 0; stamens 4.

Pistillate (female) flowers: Sepals 4; pistil 1; styles protruding; stigmas 2, bright red;

Fruit: Fruit enclosed within an urn-shaped/urceolate involucre, 1.6-2.8 in. (4-7 cm) long, of fused leafy, coarsely-toothed bracts; green ripening to brown. A nut; acorn-like, 0.6-0.8 in. (1.5-2 cm) in diameter; shell thick and hard.

Bark: Bark light brown to reddish-brown to dark brown; smooth, later developing a criss-cross netted pattern. Twigs light brown, with glandular hairs first year, becoming glabrous; sometimes grow in zig-zag pattern.

Roots: It has shallow, dense, extensive, intertwined lateral roots and rhizomes, including a taproot. Rhizome development occurs when plants are 7-12 years old. Roots and rhizomes are generally within 6 in. (15.2 cm) of the soil surface; its taproot 2 ft. (0.6 m) below the soil surface. Sprouts from roots are spaced about 2 ft. (0.6 m).

Habitat: *Corylus cornuta* grows in mesic and/or lightly shaded sites on well-drained soils (sands, sandy loams, gravels in its western-most distribution, and loam, loamy sands in other places); on moist sites in its southern and western-most distributions, and generally preferring dry-mesic in other areas; along forest edges and openings, in thickets, rocky slopes, wooded hillsides, streambanks, in coves and canyons, and in old fields. Heavily shaded plants may not flower or fruit; germination and establishment rates are also reduced.

**Species distribution in US states:** AL, CA, CO, CT, DE, GA, ID, IL, MA, ME, MI, MN, NC, ND, NH, NJ, NY, OH, OR, PA, RI, SC, SD, TN, VA, VT, WA, WI, WV, WY

### **Species images:**

Whole plant:

<http://biology.burke.washington.edu/herbarium/imagecollection/imagelarge.php?ImageNumber=15853&TaxonID=2667&SourcePage=taxon&>  
<http://oregonstate.edu/dept/ldplants/cocorc11.htm>

Bark:

<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=144>  
[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0607+0520](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0607+0520)  
<http://oregonstate.edu/dept/ldplants/cocorc2.htm>

Leaf:

<http://oregonstate.edu/dept/ldplants/cocorc4.htm>  
<http://oregonstate.edu/dept/ldplants/cocorc7.htm>  
[http://www.uwgb.edu/biodiversity/herbarium/shrubs/corcor\\_branch02.jpg](http://www.uwgb.edu/biodiversity/herbarium/shrubs/corcor_branch02.jpg)

Leaf underside:

<http://oregonstate.edu/dept/ldplants/cocorc7.htm>  
<http://www.forestryimages.org/images/768x512/1120503.jpg>

Colored leaves:

<http://oregonstate.edu/dept/ldplants/cocorc3.htm>  
<http://oregonstate.edu/dept/ldplants/cocorc10.htm>

Buds:

[http://biology.burke.washington.edu/herbarium/imagecollection/wtu16500-16999/1g/wtu016902\\_1g.jpg](http://biology.burke.washington.edu/herbarium/imagecollection/wtu16500-16999/1g/wtu016902_1g.jpg)  
<http://www.cnr.vt.edu/DENDRO/dendrology/syllabus/factsheet.cfm?ID=144>  
[http://www.uwgb.edu/biodiversity/herbarium/shrubs/corcor\\_bud01.jpg](http://www.uwgb.edu/biodiversity/herbarium/shrubs/corcor_bud01.jpg)

Inflorescence:

<http://oregonstate.edu/dept/ldplants/cocorc1.htm>

Staminate (male) inflorescence:

[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0208+2100](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0208+2100)  
[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0408+1572](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0408+1572)

Pistillate (female) inflorescence:

[http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/1g/wtu000129\\_1g.jpg](http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/1g/wtu000129_1g.jpg)  
[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0208+2103](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0208+2103)

Flowers:

Staminate (male) flowers:

[http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/1g/wtu000130\\_1g.jpg](http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/1g/wtu000130_1g.jpg)  
[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0208+2101](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0208+2101)

Pistillate (female) flowers:

[http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/lg/wtu000129\\_lg.jpg](http://biology.burke.washington.edu/herbarium/imagecollection/wtu0-499/lg/wtu000129_lg.jpg)

[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0208+2103](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0208+2103)

[http://nature.ca/plnt/popups/pop0090\\_e.cfm](http://nature.ca/plnt/popups/pop0090_e.cfm)

Fruit:

developing:

<http://oregonstate.edu/dept/ldplants/cocorc6.htm>

[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=8120+3181+4565+0080](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=8120+3181+4565+0080)

mature fruit:

<http://oregonstate.edu/dept/ldplants/cocorc13.htm>

<http://oregonstate.edu/dept/ldplants/cocorc12.htm>

mature nut:

[http://plants.usda.gov/java/largeImage?imageID=coco6\\_003\\_ahp.tif](http://plants.usda.gov/java/largeImage?imageID=coco6_003_ahp.tif)

[http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&enlarge=0000+0000+0208+2106](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&enlarge=0000+0000+0208+2106)

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

Flowering: January-June, depending on location.

Bud swell: \*Need info.

Bud break: Occurs 5-15 days following flowering. \*Need info.

Leaf out: \*Need info.

Leaf/canopy development: \*Need info. Leaf expansion late April to late May in northern Minnesota; vegetative growth stops in late July. Growth ends in September in other locations.

Bud formation: Flower buds appear in fall. \*Need info.

Fruit development: Late summer. \*Need info.

Fruit ripening: Late July-November, depending on location.

Seed dispersal: Autumn. \*Need info.

Leaf coloration: \*Need info.

Leaf fall: September (northern Minnesota). \*Need info.

## Phenophases to be monitored for NPN:

### 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 *Corylus cornuta*, 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 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 *Corylus cornuta*, a fruit is considered ripe when the bracts have turned brown and split open to release the nut inside. Ripeness may also be indicated by the presence of at least 3 fresh hazelnuts on the ground below the plant (that are not apparently from a nearby individual).
- *50% of fruit ripe [Intensive only]*  
For the whole plant, half (50%) of the fruits are ripe. In *Corylus cornuta*, 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 *Corylus cornuta*, 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?** *Corylus cornuta* is grown commercially for its edible nuts. Native Americans prepared and ate the nuts, pounded into cakes with berries, meat, or animal fat, or boiled to extract its oil for flavoring. It was also used medicinally. And its wood used for baskets, baby carriers, arrows, fishing traps, hook, spoons, and shoots processed and used for rope. Wildlife and birds utilize much of this plant for food.

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## Notes

The USDA PLANTS symbol for this plant is COCO6.  
The ITIS Taxonomic Serial No. for this species is 19507.

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

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

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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