

# Carolina Hemlock

## *Tsuga caroliniana*

### Description

The Carolina hemlock is a tall, slender, elegant tree, one of 10 evergreen conifers of the genus *Tsuga*. It can grow to 70 ft. tall and 1.5 ft. to 2 ft. in diameter, or more. Its crown is pyramidal and airy with drooping branches. The bark on young trees is a smooth red-brown that becomes scaly and fissured with age. On older trees, the outer bark is a purplish-gray and the inner bark is reddish-brown. Its leaves are needlelike, 0.5 in. to 0.75 in. long, flat, somewhat shiny, and widely spreading, they spread from the twigs in all directions, giving an appearance reminiscent of a bottle brush. The needles are dark green above and have two white stomatal bands beneath. The trees are monoecious, bearing both male and female cones on the same tree, near the branch tips. Cones of the Carolina hemlock are ovoid to oblong and light brown, with scales longer than they are wide, and spreading widely relative to the cone axis. There are no known subspecies, varieties or forms of *Tsuga caroliniana*.

### Distribution

*Tsuga caroliniana* is endemic to the Appalachian Mountains of North Carolina, Virginia, Tennessee, South Carolina and Georgia. In Virginia, it is scattered throughout the Blue Ridge and the Ridge and Valley physiographic provinces. One stand is known in a riverine bluff in the Piedmont province.

### Habitat

The Carolina hemlock is commonly found on rocky slopes and ridges or gorge walls, at elevations between 2,100 ft. and 4,000 ft. The tree is usually



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found on slightly acidic soils. The species tolerates low nutrients, low moisture and shade and is known for its slow growth. Species commonly associated with *Tsuga caroliniana* include mountain rosebay (*Rhododendron catawbiense*), mountain laurel (*Kalmia latifolia*), chestnut oak (*Quercus montana*), white oak (*Quercus alba*), scarlet oak (*Quercus coccinea*) and eastern hemlock (*Tsuga canadensis*). The stands vary from closed to open. The species is fire-intolerant.

### Life History

Pollination occurs from March to April with cones ripening the following year in August to September. The seeds are dispersed through the remaining fall and winter by wind. Seeds weigh approximately 2.5 mg. Trees normally begin producing seed at around 20 years, but large crops do not occur until 25 to 30 years. *Tsuga caroliniana* averages 187,000 seeds per pound. Propagation by cuttings and grafting is possible but is reserved for ornamentals.

The oldest recorded specimen is located in North Carolina. The oldest ring of the specimen was cross-dated to 1677. The same site contains other trees older than 280 years.

Due to its limited range, the species has little value for timber. However, it serves as essential thermal cover for various species of wildlife. Its seed and bark provide food for birds and mammals. Its attractive appearance makes it useful as an ornamental.

## Conservation

The Carolina hemlock is considered both globally secure and state secure. As such, it has no legal status for protection. However, the species is threatened by two true bugs, the hemlock woolly adelgid (*Adelges tsugae*) and the elongate hemlock scale (*Fiorinia externa*).

The hemlock woolly adelgid is an aphidlike insect that feeds on nutrients stored in the twigs. The insect overwinters on the trees, laying eggs that hatch in the spring. Larvae feed on the twigs, damaging leaves and new shoots and impairing tree health. The longer a stand of trees is subjected to infestation by the adelgid, the greater the mortality. The elongate hemlock scale attacks the tree's needles by removing fluids, causing the needles to turn yellow and drop prematurely. Limbs die from the bottom of the tree up.

Short-term management strategies for the adelgid include treatment with the insecticide imidacloprid and biological control using natural enemies. The insecticide is injected into the trees, in which it circulates and kills the pests as they feed on the tree. An application protects the tree for three years. Natural predatory beetles, the Pt beetle (*Pseudocymnus tsugae*), the tiny black beetle (*Laricobius nigrinus*) and the lady beetle (*Scymnus sinuanodulus*), are introduced and then prey on the pests, reducing damage. Long-term solutions are under investigation.

To protect the Carolina hemlock should control of the adelgid fail, North Carolina State University has collected seeds from 77 mother trees in natural populations. The goal is to sample 150 from populations across the species' range to gather the greatest genetic diversity for future breeding and restocking efforts, if needed.

## Virginia Natural Heritage

The Virginia Department of Conservation and Recreation's Division of Natural Heritage maintains a database of rare species, populations and natural communities in the commonwealth, and manages the State natural Area Preserve System. Natural Heritage biologists, stewardship, and protection staff can answer landowners' questions about rare species and sensitive habitats. The staff also provides information and expertise on conservation and management practices that help ensure that we preserve our rich natural heritage and pass it on to future Virginians.

To learn more about Virginia's rare plant and animal species and rich biological communities, visit the website of the Division of Natural Heritage, at [www.dcr.virginia.gov/natural\\_heritage](http://www.dcr.virginia.gov/natural_heritage)

*For additional information on the Carolina hemlock, see [NatureServe Explorer: Tsuga caroliniana](#)*

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