American Chestnut

Courtesy of The American Chestnut Foundation

Ill-fated Monarch of the Eastern Hardwood Forest

By David M. Smith

Opposite: **Harvesting the American chestnut in the late 19th century.**

At the start of the 20th century, the American chestnut was the most important hardwood species from Massachusetts to the southern Appalachians. It had such fine, straight stump sprouts that early foresters were starting intensive coppice management. Then, the chestnut blight hit. Today, chestnut persists mostly as understory saplings and poles.

Scientific forest management in the eastern United States was just starting when the country lost its most important hardwood species, a catastrophe unique in world forests. A fungus was unwittingly introduced on Asiatic chestnuts planted for specimen trees and nut production near New York City. Foresters in the East had developed comprehensive plans for intensive management of fast-growing chestnut sprout forests, until the blight dashed their hopes.

Before the chestnut blight reduced it to the status of a small, short-lived sprouting tree, American chestnut *(Castanea dentata)* was abundant from Massachusetts to Alabama and westward to Ohio and middle Tennessee (Braun 1950). In much of that area chestnut comprised the most timber volume of any species. It usually occurred in mixture with oaks and other hardwoods; occasionally hemlocks and pines also were in the stands. Chestnut was most common on midslopes and other moderately dry soils, but stands characterized by white oak or chestnut oak were more common on very dry soils. Chestnut shared moist mesophytic soils with many other species, but was rare or absent on poorly drained soils. In the southern Appalachians it was most abundant on north-facing slopes, as it grew poorly on south slopes (Buttrick et al. 1925). Because of its remarkably rapid growth from stump sprouts, chestnut had come to form nearly pure stands after repeated coppice cuttings for fuelwood in populous areas.

Tallest of the Tall

In the southern Appalachians young chestnuts grew faster in height than other species, and reached half their ultimate height by the 20th year (Ashe 1912). Only two other species, white pine and yellow poplar, could grow taller. On the best sites the height of chestnut culminated at more than 100 feet, and on lesser-quality sites at 70 to 90 feet. Ashe found that chestnut tap roots divided into many vertical roots that might extend four to five feet down, with many lateral roots as well. Chestnut was not common on the best mesic soils, those derived from limestone, or poorly drained clay soils.

Trees of seed origin usually caught up with the sprouts at about 70 feet and 55 years of age (Hawes 1906). Sprouts were relatively susceptible to heart rots, which would begin to appear when trees were 70 years old and 20 inches dbh.

Chestnuts commonly were emergents that comprised all of the top stratum in mixed stands. The oaks that typically formed the second stratum were often crooked trees that leaned toward small canopy gaps in the cover of chestnuts above them. In some 28-year-old coppice stands in Connecticut, the average chestnut was 48 feet tall; red oaks, the closest competitors, were 39 feet tall (Schwartz 1907).

Tree of Many Uses

Chestnut was the most important species in what was once called the Sprout Hardwood Forest, an industrial area that extended from Providence, Hartford, and Albany at the northern

Photo by Walter O. Filley, courtesy of Connecticut Agricultural Experiment Station

An American chestnut towers above other hardwoods in Scotland, Connecticut, about 1905.

end to Philadelphia at the southern end (Hawley and Hawes 1912). Two centuries of heavy demand for industrial and domestic fuelwood had created large areas of short-rotation coppice forest. Chestnut sprouts dominated because they outgrew the oaks and other species. Chestnuts often were kept along fence rows and in pastures because of their copious production of sweet nuts (Moss 1973).

Chestnut was initially a primary object of attention in the silvicultural efforts that the state of Connecticut and Yale University, in conjunction with the US Bureau of Forestry, started in 1900 (Hawes 1906; Schwartz 1907). Half the standing timber volume of Connecticut was chestnut, most of it in young coppice stands.

Because of its resistance to decay, chestnut was a fine species for poles, pilings, posts, and railroad ties that would last for decades on the ground without treatment (Moss 1973). Some stump sprouts grew straight enough to meet stringent standards for telephone poles as tall as 65 feet (Hawes 1906). The sapwood was actually less prone to rot than the heartwood, so it often was used for construction timbers where rot resistance was critical. Chestnut ties were not as strong as those of denser hardwoods, so they were better-suited to light traffic, such as trolley lines, than for heavy-duty railroad lines. Large quantities were still used for fuel, although the use of coal was increasing rapidly to meet demand. Because of its uniform density, chestnut was an ideal fuel for the annealing of brass, a process requiring good temperature control. And charcoal production was critical for metal smelting furnaces.

Stump sprouting was so prolific and produced enough good stems that this practice was used almost exclusively (Zon 1904; Ashe, 1912; Hawley and Hawes 1912). It was recommended that the sprout clumps be thinned to release straight stems and enhance diameter growth. In the fashion of the times, these thinnings were very light. Advanced regeneration of chestnuts could persist beneath old stands for 30 to 60 years by dint of their ability to resprout after sudden diebacks that occurred at intervals of 12 to 18 years (Schwartz 1907). Seeding sprouts from advanced regeneration were regarded as superior sources of trees grown for sawtimber. Chestnuts grew so fast that their loss meant that rotations designed to produce any particular kind of product had to be much longer.

Prolific Growth and Yield

Comprehensive data on growth and yield were obtained in Connecticut before the effects of the chestnut blight became significant (Frothingham 1912). On the best sites, stands of more than 60 percent chestnut had mean annual increments that peaked at 101 cubic feet per acre at 35 to 40 years. In such stands the mean annual increments of other products (in all species) were still increasing at age 75, at 343 bd ft, 14.3 ties, and 1.5 poles per acre, respectively. The same values for second-class sites were 80 cubic feet, 241 bd ft, 7.7 ties, and 0.8 poles per acre. The cubic-foot yields from stands on similar sites in which oaks predominated were approximately 25 percent lower.

Buttrick et al. (1925) reported mean annual increments of one cord or 500 bd ft per acre per year on 60-year rotations in chestnut stands west of the Blue Ridge Mountains, where chestnut formed 27 percent of the regional

board-foot volume. They also reported that chestnuts in the Piedmont were dying of an unidentified disease, not the chestnut blight. According to a 1905 account by Reed, a similar disease had 50 years earlier eliminated chestnut from longleaf pine lands in central Alabama. Crandall et al. (1945) later concluded that this disease was caused by *Phytophtora cinammomi.*

Efforts to Halt the Blight

Many blight-killed chestnut were salvaged. The virulence of the blight was so well recognized that many owners cut the trees before they died. The dead trees deteriorated so slowly that many were salvaged after they had been dead for 10 or 20 years.

The most aggressive attempt to halt the spread of the blight was made by the Commonwealth of Pennsylvania (1914), which briefly tried to remove chestnut over a wide area in an effort to halt the blight's southward spread, to no avail. In areas not yet infected there was the vain hope that the blight would stop before it reached them. Probably because of the prevailing westerly winds, the blight spread quickly to the east but more slowly southward.

The Future

The blight did not cause deforestation because there were always plenty of oak and other lower-stratum trees ready to start rapid growth. Enough chestnuts are produced by trees that grow in open conditions that new seedlings continue to appear beneath some existing stands. As a result, chestnut persists widely as understory saplings and poles that keep resprouting after the blight kills the tops. Current genetic efforts to produce chestnuts that are resistant and blight fungi that are less virulent may soon restore the chestnut monarchy in eastern hardwood forests.

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