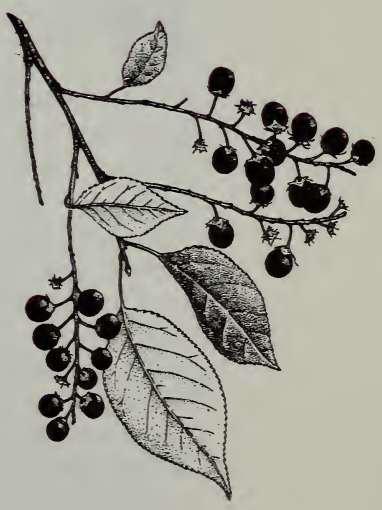
Silvical Characteristics of Black Cherry

(*Prunus serotina*)

by Ashbel F. Hough



STATION PAPER NO 139 • NORTHEASTERN FOREST EXPERIMENT STATION • 1960
FOREST SERVICE • U. S. DEPARTMENT OF AGRICULTURE • UPPER DARBY, PA.
RALPH W. MARQUIS, DIRECTOR

Preface

MUCH of the silvical information on our forest trees is widely scattered and sometimes difficult to find. To make this material more readily available, the Forest Service is assembling information on the silvical characteristics of all the important native forest tree species of the United States. It is expected that this information will be published as a comprehensive silvics manual.

This report presents the silvical characteristics of one species. It contains the essential information that will appear in the general manual but has been written with particular reference to the species in the Northeast. Similar reports on other species are being prepared by this Experiment Station, and by several of the other regional forest experiment stations.

Silvical Characteristics of Black Cherry

by Ashbel F. Hough

About the Author ...

ASHBEL F. HOUGH *is a pioneer in U. S. Forest Service research on the Allegheny Plateau, having spent the last 30 years in studies of the ecology, silvics, silviculture, and management of the Allegheny hardwood-hemlock forest region of New York and Pennsylvania. He was graduated from Syracuse University in 1923 and took his Master's degree at Yale in 1927. Formerly in charge of research on the Kane Experimental Forest at Kane, Pa., he is now in the Division of Forest Management Research at the Northeastern Forest Experiment Station headquarters at Upper Darby, Pa.*

The Black Cherry

BLACK CHERRY *(Prunus serotina* Ehrh.*)* is the largest of the native cherry trees of the United States. It may grow to more than 100 feet in height, and to as much as 5 feet in diameter. It is the only species of its genus that provides lumber for commerce. And this lumber, because of its stability and its superior working qualities, is one of the most precious of cabinet woods.

Many natural varieties or subspecies of black cherry have been recognized by taxonomists *(45, 47, 58)*. This report deals with the typical variety, *P. serotina* var. *serotina*, which is known also as wild cherry, rum cherry, and mountain black cherry *(8, 41, 44, 45)*.

According to McVaugh *(47, 48)* the inclusive species *Prunus serotina*, with its several populations, had a common descent from some ancestral form of the early Cenozoic or late Mesozoic era in the tropics of the New World. The early forebears of *Prunus serotina* migrated as far north as the southern United States on both sides of the North American continent, possibly during the Mesozoic, and were subsequently divided by the Cretaceous seas into two distinct populations, eastern and western. Fossil evidence of a progenitor of *Prunus serotina* has not been discovered in the United States or elsewhere.

The present distribution of the various subspecies or natural varieties suggests the early separation of a distinct race, var. *alabamensis* (Mohr) Little (subsp. *hirsuta* (Ell) McVaugh), from a primitive pubescent stock having large floral leaves. It became established and persisted through the Cenozoic in what is now the southeastern United States. This race is now surrounded by, but hardly in contact with, the typical and more recent race, var. *serotina*. "In western North America one may surmise that the rufous-

pubescent var. *rufula*[1] is the lineal descendant of a stock which has persisted in a region of comparable geological antiquity, the Sierra Madre Occidental from Durango to southern Arizona," McVaugh *(47)* wrote.

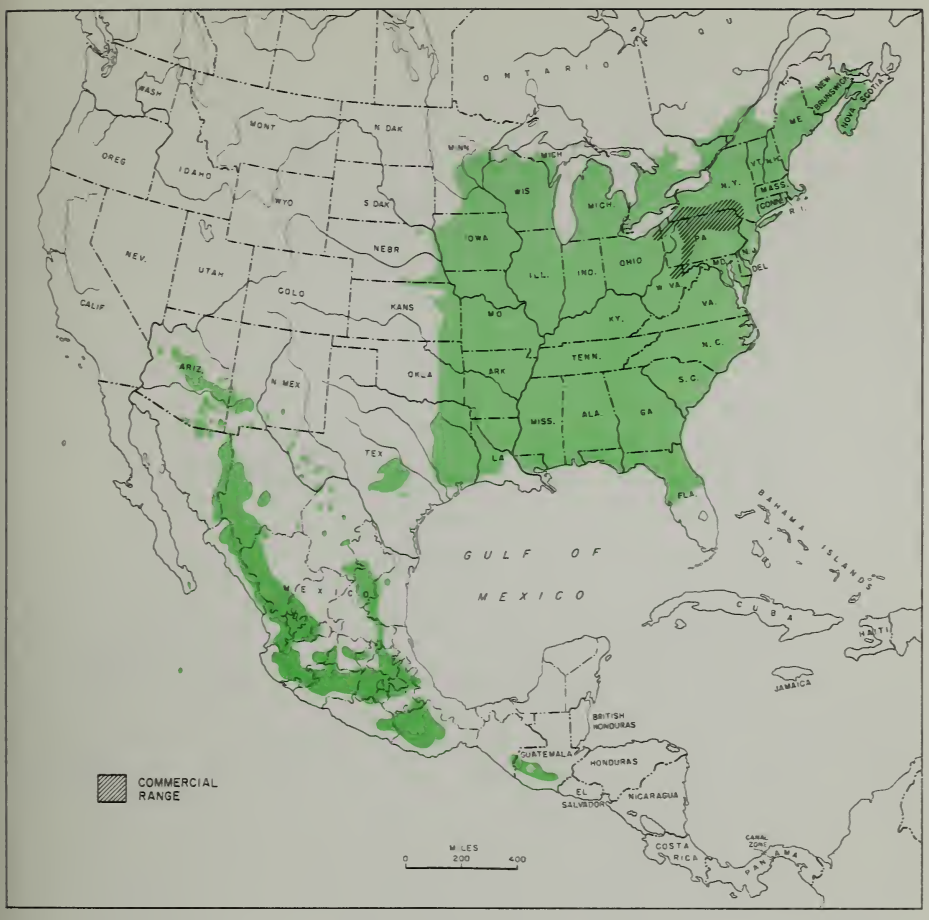
Following the evolution of the eastern and western populations of *Prunus serotina*, there developed a widespread and uniform type that was markedly mesophytic, with relatively large leaves, luxuriant growth, and with branchlets, petioles, and leaves usually free of hairs except for the tufts or fringes along the midrib on the lower leaf surface. This typical population of *Prunus serotina* var. *serotina* probably developed at a relatively recent date, geologically speaking, migrating from south to north, perhaps during the Pleistocene or glacial era. It has hybridized with the original populations wherever contacts were made *(47)*.

An example of an isolated race that is a morphologically distinct variety is *Prunus serotina* var. *exima* (Small) McVaugh and Little, known as Escarpment or Edwards Plateau black cherry. This appears to be a relatively recent offshoot of the stock of var. *serotina*, which was isolated on the Edwards Plateau of Texas by increased aridity during the Pleistocene. It has not mixed with hairy or short-petiolate stocks of the Southwest, though it bears some of the characters of var. *alabamensis* (subsp. *hirsuta) (47)*. Other ecotypes of the typical var. *serotina* doubtless exist because of its spread into new areas to the north, and also because of restrictions, caused by aridity and glaciation, during its development.

The black cherries of Guatemala and southern Mexico are regarded by McVaugh as a mixed and variable population instead of a single species or subspecies. Some elements strongly resemble the typical var. *serotina* and are indistinguishable from plants of eastern North America. Some of the characters of the modern Capulin black cherry populations are derived from the same stocks that gave rise to var. *rufula* and var. *alabamensis*. The large-fruited "capulin"--named subspecies *capuli* (Cav) McVaugh or var. *salicifolia* (H.B.K.) Koehne, by Little *(45)*--has long willow-like leaves and elongate, nearly smooth, racemes. This race is of fairly recent origin, late Pleistocene or even within the last few thousand years, perhaps as a single mutation. It has been carried by man within historic time to points far-

---

[1]The subspecies Virens (Woot and Standl.) McVaugh, and two varieties of this subspecies, virens var. virens and virens var. rufula, have been grouped by Little (45) into his Prunus serotina var. rufula (Woot and Standl.) McVaugh with the common name of Southwestern black cherry.



DISTRIBUTION MAP BY ELBERT L. LITTLE, JR., U.S. FOREST SERVICE

Figure 1.--*The natural range of black cherry, including varieties.*

ther south in Central America, in South America from Venezuela to Bolivia, and at an early date in California *(47)*.

The range of the typical variety of black cherry is wide, extending from Canada to Florida, west to eastern Texas, Oklahoma, Kansas, eastern Nebraska and Minnesota *(68)*. It is also found in eastern and southern Mexico, the Revilla Gigedo Islands, and Guatemala. The range of var. *exima* in Texas and var. *rufula* in the southwestern United States and Mexico is also indicated by figure 1 *(45)*.

Despite the wide range of this species in all its varieties, the areas of commercial importance are rather limited. The chief commercial stands of second-growth black

cherry today are on the northern Allegheny and Pocono Plateaus in Pennsylvania and adjacent areas in the Catskills and western New York. The commercial range extends into the mountains of western Maryland and West Virginia and part of northeastern Ohio (fig. 1). Other states producing limited amounts of black cherry are Michigan, Indiana, Maryland, and Massachusetts *(3, 65)*. The Appalachian Mountain sections of Kentucky, Tennessee, North Carolina, and Virginia have scattered stands or individual trees, particularly on cove sites *(5)*.

Habitat Conditions

CLIMATIC

Black cherry and its varieties grow under a wide range of climatic conditions, from the arid semi-deserts of the Southwest and northern Mexico to the moist or wet subtropical climates of Florida, Louisiana, eastern Mexico, and Guatemala. It grows in the moist temperate climate of the Lake States and the wet cold climates of Maine, New Brunswick, and Nova Scotia *(67)*.

A cool, moist, temperate climate with adequate and well-distributed precipitation characterizes the commercial range of black cherry *(31, 49, 62, 67)*. The areas where it thrives on the northern Allegheny Plateau have an average annual precipitation of 32 to 46 inches, and an average summer precipitation of 20 to 24 inches. The frost-free growing season is 100 to 160 days. Average annual temperature is from 46° to 50°F., with a January average of 20° to 26° and a July average of 66° to 72°.

SOILS

Black cherry grows well on podzol and gray-brown podzolic soils within its principal commercial range. On the Allegheny Plateau (fig. 2 and fig. 3), good development is found on true podzol soils of residual origin of the Dekalb-Leetonia group and on associated soil types such as Cookport and Clymer silt loams *(31)*. Typical Dekalb soils are derived from sandstones, shales, and conglomerates on steep topography and are stony with sandy to loamy or silt-loam upper horizons and clay-loam subsoils. Soils with shallow to medium-depth gley layers (1 to 3 feet), such as

Figure 2.--*A 36-inch black cherry on the Allegheny National Forest. This tree, growing in the Tionesta Natural and Scenic Area, has 54 feet of clear stem to the first branch. It is 141 years old and 111 feet tall.*

the Lickdale, Volusia, Culvers, Langford, Mahoning, and Holly series *(66)*, are relatively poor for black cherry growth *(74)*.

In glaciated sections black cherry grows well on the moist but well-drained soils of the Lackawanna, Walton, Tunkhannock, Lordstown, Bath, Lansing, Wooster, Worth, and Ontario series. These are weakly podzolized or gray-brown podzolic soils developed on glacial till from sandstone, shale, and occasionally limestone parent materials. Texturally they are loamy to gravelly in the surface layers, with silty to clayey subsoil *(31, 66)*. The dry soils of ridge tops and of south and west exposures are less favorable for black cherry and its associates than the deep moist soils of lower slopes and north or east exposures *(37)*.

PHYSIOGRAPHIC

Within its commercial range, at elevations of 1,000 to 2,600 feet, black cherry second-growth is found on all kinds of physiography and sites, with the exception of the very swampy or very dry. In Canada it grows near sea-level while in Appalachian coves it reaches elevations of 5,000 feet or more *(43)*. The best possibilities for regeneration are found on moist, fertile, north- and east-facing lower and middle slopes, and in coves *(37, 38, 73)*.

BIOTIC

The plant associates of black cherry are numerous because of its wide botanical range and its habit of growing in mixed stands *(5, 6, 60)*. Chief tree associates are sugar and red maples, beech, yellow and sweet birches, basswood, white ash, and hemlock. Occasional associates are American elm, buckeye, butternut, northern red oak, and red spruce *(60)*.

Among the more important animal associates are white-tailed deer, red foxes, black bears, raccoons, chipmunks, mice, and squirrels--all consumers of black cherry fruits and seed.* Deer also browse upon cherry seedling and sprout reproduction. Rodents, notably the white-footed mouse, use the greatest amount of the seed, storing large quantities in addition to what they eat in season *(17, 21)*. In caching the seed in the ground they often carry it considerable distances to new locations. Occasionally they miss a cache, which develops into a close-packed group of new seedlings *(1)*.

---

*Hough, A. F., unpublished observations.

Figure 3.--*The author and a mature black cherry tree in the Allegheny National Forest.*

Some 46 species of song and game birds, including wild turkey and ruffed grouse, eat black cherry fruits *(46, 71)*. The pits are either regurgitated or distributed in their droppings *(1, 46, 71)*. Thus forest openings well removed from cherry seed trees often become stocked to cherry seedlings from bird-deposited seed *(1)*.

Life History

SEEDING HABITS

Flowering & Fruiting

Within its wide range, black cherry begins flower development from the end of March in Texas to the first week of June in Quebec, Canada *(59)*. Unlike the domestic cherries, which flower before the leaves appear, black cherry flowers develop late in relation to leaf development (fig. 4). The Latin name *serotina*, which means "late appearing or opening", is in recognition of this characteristic *(10)*. At the latitude of 41 to 42° in Pennsylvania and New York, black cherry flowers appear around May 15 to 20, at which time the leaves are nearly full-grown though still reddish in color *(8, 41)*.[2]

The perfect flowers are pollinated chiefly by insects. Several species of flies (Diptera), a flower beetle (Coleoptera), and several species of bees, including the honey-bee (Hymenoptera), have been observed working the blossoms.*

Recent observations[2] indicate that late spring frosts may damage the flowers before they open. Frost also may occasionally cause large numbers of newly set fruits to fall from the pedicels instead of maturing.

The fruits ripen from August 15 to early September on the Allegheny Plateau. Ripening dates, of course, are somewhat earlier southward and later northward. The fruit is a drupe with a slightly bitter pulp and a thick skin *(8, 17, 22, 41, 69)*. The micropyle is open, permitting moisture to reach the endosperm during after-ripening and germination.

---

[2]Bennett, A. L. Personal communication, 1955.

Seed Production & Dissemination

Individual trees produce some seed nearly every year. Good seed crops for entire stands are produced every 3 or 4 years. Viable seed is produced on open-grown seedlings or sprouts as young as 10 years, and by stands as old as 180 years.* Seed fall begins when the fruits ripen, and all are dispersed before late autumn. Cleaned black cherry seed ranges from 3,100 to 8,100 per pound, averaging 4,800 *(69)*.

The bulk of the seed crop falls to the ground in the vicinity of the mother tree. Autumn leaves cover the seed and natural stratification and cold treatment prepare it for germination in the spring. Groups of black cherry trees 30 to 100 years old ordinarily will produce an ample to super-abundant seed supply for forest regeneration purposes, in excess of animal consumption.

VEGETATIVE REPRODUCTION

Black cherry sprouts readily from stumps of all sizes and the sprouts grow rapidly, especially in openings. An instance is known of a 258-year-old black cherry, 48 inches

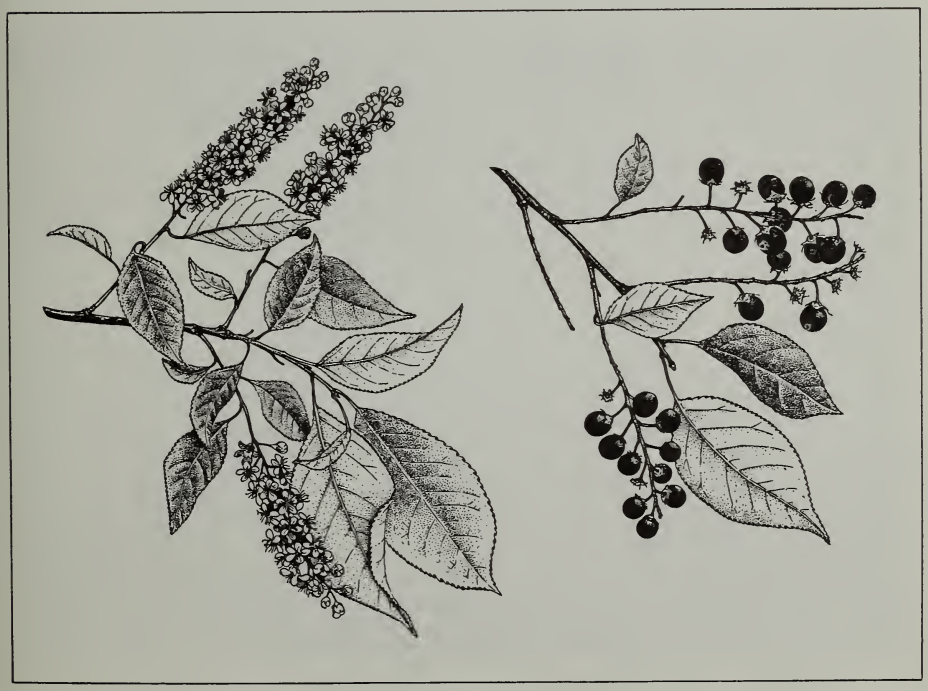


Figure 4.--*The flowers and fruit of black cherry.*

d.b.h., sprouting from the stump after cutting.* Small suppressed seedlings that have been released, but bent or broken by logging operations, will produce well-formed sprouts from the root collar. However, sprouts from the stumps of merchantable-size trees tend to be of poor form. Most of the third-growth black cherry regeneration developing after second-growth cherry stands have been clear-cut is of sprout origin *(37, 40, 53)*.

Black cherry can be readily grafted by the usual methods. Judging from the results with cultivated cherries *(61)*, cuttings of black cherry probably could be rooted by use of auxins.

SEEDLING DEVELOPMENT

Germination & Establishment

Before germination will take place, the seed requires a period of after-ripening that, under natural conditions, occurs over winter in the forest floor. Contrary to some beliefs, germination does not depend upon partial decomposition of the bony seedcoat by soil organisms or by passing through birds, or upon splitting of the seedcoat by frost.

Black cherry seed that has been stored dry, either with or without pulp, and regardless of storage temperature, may manifest dormancy of embryo or endosperm and require 45 days or more of moist cold stratification to properly afterripen. Seed that has been stored dry 2 or 3 years still will germinate fairly well after such stratification *(1)*. Germinative capacity of black cherry seed ranges from a low of 21 percent and an average of 63 percent to a high of 87 percent *(23, 69)*. Up to 95 percent germination occasionally may be obtained from high-quality seed *(22)*.*

At the time of germination, the endosperm swells and splits the stone into two halves. Germination is hypogeous, that is, the cotyledons remain in place in the soil *(69)*.

The seedbed requirements for germination are not rigid. Either undisturbed leaf-litter and humus or, to a lesser extent, exposed mineral soil are good seedbeds. Few seed germinate in areas denuded or compacted by logging machinery. Seeds buried 2, 4, or even 6 inches deep in loose mineral soil have been known to germinate and develop seedlings of normal shoot length. Delayed germination due to deep storage in the soil is thus unlikely.

Inasmuch as black cherry seedlings are comparatively vigorous from the start, and can emerge from seed lying

under one to several inches of litter or loose soil, surface moisture requirements for germination and initial establishment are not so exacting as for many associated species. Neither, during these early stages, are the light requirements exacting. In the forest under canopy, myriads of cherry seedlings start in the vicinity of seed trees practically every year, and substantial numbers of them may survive into the second and third years.

However, under canopy the seedlings are unable to cope for long with the combination of low light intensity and root competition. So there commonly is a continuing process under way of germination, temporary establishment, and mortality, with living representatives of no more than 2 or 3 annual generations of seedlings present at any one time. Only in openings, where the adverse factors of low light intensity and root competition are somewhat ameliorated, can the seedlings survive and continue to grow.

The best situations for black cherry establishment and subsequent growth are small circular or narrow strip openings in the forest (fig. 5). In general, the width of these openings should approximate the height of bordering trees. Light, soil moisture, and microclimatic conditions

Figure 5.--*A dense growth of black cherry seedlings in a small opening.*

generally are nearer optimum in such openings than in either larger clearings or smaller openings *(16, 32, 37)*.

Newly germinated black cherry seedlings are subject to damage by late spring frosts. In large clearings severe losses occasionally may occur.

Early Growth

Black cherry seedlings reach heights of 2 to 4 inches in the first 30 days of growth. Under shade they may be no more than 4 to 6 inches tall at the end of the first season, but in the open may reach 18 or more inches *(27, 37, 64)*, and in nursery beds up to 3 feet. On clear-cut strips in Pennsylvania, cherry seedlings reached heights up to 2.4 feet during the first year after cutting *(37)*; however, some of these may have started under the stand the year before. Toumey *(63)* in Connecticut reported average heights of 6 inches the first year, 3 feet the second year, and up to 7 feet the third year.

Under natural forest conditions, black cherry seedlings may become established in openings created by the death of mature trees, by windthrow, or by fire. In the smaller openings, the cherry often will grow faster than associated tolerant climax species, though considerably slower than in full sun. Seedlings in these situations may require 10 years to reach 4.5 feet in height and 20 years to reach 0.6 inches d.b.h.

Seedlings typically develop a taproot with numerous laterals. The taproots penetrate to a depth of 6 to 8 inches the first year in most forest soils, and 10 to 16 inches in deep, sandy loam nursery beds *(63)*. The taprooted form persists for several years, especially in well-drained loamy soils, but during the sapling stages usually gives way to a spreading, superficial form of root system in which a distinct taproot no longer is evident.

Rabbits and deer account for a great deal of damage to cherry seedlings (and sprouts). In places where excessive populations of either rabbits or deer have built up, practically all black cherry reproduction may be destroyed unless protected in some way *(18, 35)*.

Large numbers of black cherry seedlings sometimes are weakened or killed by a leaf-spot disease caused by *Coccomyces lutescens*. Recent work on cultivated cherries gives promise of a means of control by use of a fungicide known as Actidione (semicarbazone derivatives), which has systemic

antibiotic activity *(19, 20)*. Cyprex, or certain dodecylguanidine derivative fungicides, also offer promising control of leaf spot *(20, 42)*.

SAPLING STAGE TO MATURITY

Growth Rates

In adequately lighted openings, black cherry seedlings begin to overtop competing vegetation such as blackberries and advance growth or sprouts of the more tolerant species in 3 to 5 years. Cherry sprouts make much faster growth and overtop their competition in 1 or 2 years.

Sprouts are generally of poorer stem-form and more subject to heart rot than seedlings, and, being weakly attached to the parent stump, are subject to breakage *(9)*. They are too rapid-growing to undergo natural pruning except in the center of the clump *(28)*. Seedlings therefore are a much better source of stock for future sawtimber production *(52, 53, 72)*.

The general pattern of growth in pure even-aged stands of black cherry in New York and Pennsylvania is very rapid for the first 45 to 50 years, gradually tapering off during succeeding decades.[3]

In a natural, untreated, sapling stand on the Allegheny Plateau, trees with good crowns that were free to grow (dominants and co-dominants) put on an average of 2.5 inches in diameter growth per decade between the ages of 13 and 33 years.*

As stands move into the 40- to 60-year bracket, diameter growth tends to slow down to 2 inches or less per decade for the free-to-grow dominants and co-dominants. Intermediate and suppressed trees may average around 1.5 inches and 0.7 inches, respectively, per decade *(33)*. On the more favorable sites growth may considerably exceed the rates indicated above. Diameters of 20 to 24 inches and heights of 80 to 100 feet may be reached in 60 years by the stronger black cherry dominants in mixed, unmanaged stands *(30)*.

A maximum height of 129 feet and age of 258 years have been recorded for cherries in the Tionesta Natural and Scenic Area of the Allegheny National Forest *(29, 51)*. The

---

[3]Defler, Samuel E. Black cherry; characteristics, germination, growth, and yield. Unpublished thesis, New York State College of Forestry, Syracuse, N. Y. 1937.

Figure 6.--*The bark pattern typical of mature black cherry.*

annual-ring patterns of such aged veterans show the characteristic rapid early growth, but after 100 years they had grown very slowly in both height and diameter.

Black cherry, like other intolerant species, requires a free or dominant crown position to thrive. Trees that have fallen behind into intermediate and suppressed positions undergo a marked decline in growth rate and are apt to die *(33, 34)*. The species commonly shows little response to thinning: the competitive position of the dominants is not greatly changed by such treatments; sub-dominants, after having been slowed down and weakened by suppression, generally lack the capacity to recover even though ample light and space are provided. In one study, for instance, dominants released by weeding in a 13-year-old sapling stand grew 2.8 inches per decade in diameter during the next 20 years, whereas unreleased dominants did practically as well at 2.5 inches per decade. In another study, thinning a 40-year-old stand induced no growth response in black cherry of any crown class during the ensuing decade *(33)*.

Cherry trees of good vigor may show a growth response, however, when released to a greater degree than in the usual silvicultural weeding or thinning. This is illustrated on pulpwood cuttings to an 8-inch diameter limit where scattered cherries have been reserved as sawlog crop trees. These trees with essentially isolated crowns often develop additional crown, become relatively windfirm, and may put on up to 3 inches of diameter growth per decade.[4]

[4]Ehrhard, E. O. Personal communication.

Figure 7.--*Black cherry in a mixed hardwood stand. To thrive, cherry must get its crown above the crowns of competing trees.*

Black cherry is less inclined to produce epicormic branches than most associated hardwoods. However, after sudden exposure, epicormic branches sometimes do develop *(25)*, and instances of sunscald, stag-heading, and general decadence also have occasionally been observed.

In unmanaged second-growth stands on good sites, the trees may reach commercial sawtimber or veneer log size at 60 to 80 years. Yields in pure stands may be comparatively high. In one study, a stand at 60 years on a site of index 70 ran 5,500 cubic feet or 11,000 board feet per acre; in another stand 80 years old, site index 90, there were 8,500 cubic feet or 24,000 board feet per acre. Cubic-foot volume growth culminates at about 120 years in unmanaged stands. Under management, black cherry could be expected to grow to sawlog size in 50 years *(30)*.

Rooting Habit

The root-system of black cherry is predominantly spreading and shallow, even in well-drained soils. Most of it is restricted to the upper 2 feet of soil, with occasional sinkers extending down 3 or 4 feet.[5] On wet sites the tendencies toward shallow rooting are especially pronounced *(36)*. Because of its comparatively shallow rooting, and its tendency to grow taller than associated species in mixed stands, cherry is quite subject to windthrow, being especially vulnerable on wet or poorly drained sites.*

Natural Enemies

Among the insect pests of black cherry, the eastern tent caterpillar *(Malacosoma americana)* and the ugly-nest caterpillar *(Archips cerasivorana)* are the only defoliators of importance. These frequently cause growth loss and may cause occasional mortality *(11)*. Borers of the genera Scolytus, Dicerca, and Dryocoetes do some damage, but mostly attack weakened trees. Adults of *Dryocoetes betulae* have been found in the bark of living black cherry, causing gum spots. The peach bark beetle *(Phthorophloeus liminaris)* is another bark beetle that may occasionally cause gum-spots *(11)*.

Recent studies indicate that dipterous cambium-mining larvae of the family Agromyzidae, namely *Phytobia pruni* Gross., are the principal cause of pith flecks and gum spot

[5]Hough, A. F. The forests of the Allegheny Plateau; their ecology and silviculture. Unpublished manuscript, 383 pp., Northeast. Forest Expt. Sta., 1941.

or streaks in black cherry on the Allegheny Plateau.[6] Gum-spot apparently may be caused by several types of injury or infection *(4, 7, 24, 57)*.

A number of fungi attack black cherry in addition to the leaf-spot disease previously mentioned. One of the more common is the black knot fungus *(Diobotryon morbosum)*, an ascomycete infecting current-year twigs of seedlings, saplings, and mature trees and causing cankerous swellings that may extend to the larger branches and bole *(2, 4)*. All other important fungus diseases are wood rots. *Polyporus spraguei*, *P. berkeleyi*, and *Coniophora cerebella* cause butt rots; and *Poria prunicola*, *P. mutans*, *Fomes pinicola*, and *Polyporus sulphureus* cause trunk rots. Most of these rots give no external evidence of their presence except *Fomes pinicola*, which forms conks on about half of the trees infected *(13)*.

Porcupines do considerable damage to black cherry in some localities, both directly by scarring or consuming the bark, and indirectly by providing entry points for wood-rotting fungi.[5]

Cherries of all sizes are highly susceptible to fire injury; however, except after very hot, deep-burning fires, most top-killed trees resprout from the base. Trees that have been scarred by fire are highly susceptible to invasion by wood-rotting fungi through the wound.

Since black cherry typically towers above the general canopy in mixed stands, it is somewhat more vulnerable to storm breakage than the associated species, and the commercial cherry range is subject to severe wind, snow, and glaze storms *(15, 38)*. Sapling and small pole-sized cherry bent by glaze seldom recover an upright form *(38)*. Vigorous older trees often make remarkable recovery from crown breakage with little impairment of diameter growth. However, the larger stubs left after crown breakage provide avenues for fungus infections which means increased cull due to rot if the trees stand another decade or so before harvesting *(13)*.

Successional Position

Black cherry is a minor member of the mixed mesophytic climax *(5)*. Being intolerant, it was never abundant in the virgin forest, except locally and temporarily after disturbance or catastrophe *(26, 31)*. It tends to dominate the secondary successions initiated by logging, fire or

[6]Hough, A. F. Gum spots and pith flecks in black cherry. Manuscript in process of publication. 35 pp., illus. 1960.

windthrow. Near the prairie border it is similar to bur oak in its ability to pioneer early successional stages *(12, 14)*.

Black cherry increased tremendously in its commercial range after the clear-cuttings of 50 years or so ago. But unless controlled by appropriate silvicultural practices, natural succession will eventually crowd most of the cherry out of the present-day second and third growth, and it will revert to a status similar to its position in the virgin forest.

Reaction to Competition

In pure stands, young even-aged black cherry readily expresses dominance and differentiates into various crown and diameter classes. Dominants and co-dominants continue rapid growth, whereas the sub-dominants decline in growth and those in the poorer crown positions gradually die out. Thus black cherry stands typically display a range of crown and diameter classes. At 50 to 60 years the diameter range is mostly from 10 to 24 inches (fig. 7). Any smaller trees in such stands usually are of other--and more tolerant--species.

Natural pruning from an early age is best achieved when the crop trees are survivors from dense sapling or pole groups. Regeneration in such groups can best be obtained by clear-cutting in strips or in patches of about ½ acre *(37, 38)*. Co-dominants from the inside of dense groups will provide the highest quality crop trees.

Black cherry more characteristically grows in association with other species than in pure stands. In reproduction of mixed species, the fast-growing cherry usually overtops its associates in a few years and then tends to spread and become forked *(28, 52)*. However, in such mixtures there will often be groups of cherry in which some stems will be of good form and naturally pruned. Mixed stands of pole size or larger trees with a strong component of cherry dominants provide excellent site protection, favor natural pruning, and make more nearly full use of the space and the growth potential of the site than do pure stands.

Special Features

The leaves, twigs, and bark of black cherry contain cyanic acid; and wilted foliage is poisonous to domestic livestock *(50, 71)*. However, deer can eat unwilted foliage with impunity *(46)*.

The bark has medicinal properties. In the southern Appalachians bark is stripped from young black cherries for use in cough medicines, tonics, and sedatives *(39, 54, 55, 56)*.

The fruit is used for making jelly. It is also used for making wine, and Appalachian pioneers sometimes flavored their rum or brandy with the fruit to make a drink called "cherry bounce". To this the species owes its name "rum cherry" *(41, 55)*.

But it is for its wood that black cherry is best known. The wood seasons well, works well, holds its shape, and takes finishes beautifully; and it is considered one of the very finest cabinet woods. Besides its use in fine furniture, black cherry is used in the printing trade for backing blocks on etchings. It is used for handles, professional and scientific instruments, patterns, woodenware novelties, and--finally--for high-quality caskets *(3, 65, 70)*.

Some black cherry is used for pulpwood, chemical distillation wood, and fuel wood. Some is manufactured into dimension stock for furniture manufacturers. Choice logs are used for veneer for furniture and architectural panelling. High-quality veneer logs sell for as much as $500 per thousand board-feet f.o.b. railroad. Recent stumpage sales in the Allegheny National Forest, for stands containing a large proportion of veneer logs, have run as high as $200 per thousand board-feet, log scale.

Racial Variations

The possible races of black cherry and their development have been pointed out by McVaugh *(47)*. His subspecies may be regarded essentially as races within which there is ecotypic variation based on habitat or genetic characters.

Additional studies by taxonomists, physiologists, and geneticists are required to determine the validity of these subspecies, varieties or races, and the degree of hybridization involved. Future work will also be necessary to show the degree of ecotypic variation within the wide-ranging typical variety *Prunus serotina* var. *serotina* and in the older races such as var. *alabamensis* in the East and var. *rufula* in the West, as well as the mixed population in southern Mexico and Guatemala.

Literature Cited

(1) Baldwin, Henry Ives.
1942. Forest tree seed of the north temperate regions with special reference to North America. 240 pp., illus. Waltham, Mass.

(2) Baxter, Dow V.
1952. Pathology in forest practice.
Ed. 2, 618 pp., illus. New York.

(3) Betts, H. S.
1945. Black cherry (Prunus serotina).
U. S. Dept. Agr. Forest Serv. Amer. Woods Ser. 4 pp., illus.

(4) Boyce, J. S.
1938. Forest pathology.
600 pp., illus. New York.

(5) Braun, E. Lucy.
1950. Deciduous forests of eastern North America.
596 pp., illus. Philadelphia and Toronto.

(6) Bray, W. L.
1915. The development of the vegetation of New York State.
N.Y. State Coll. Forestry Tech. Pub. 3. 186 pp., illus.
Syracuse.

(7) Brown, H. P.
1913. Pith-ray flecks in wood.
U. S. Dept. Agr. Forest Serv. Circ. 215. 15 pp., illus.

(8) ----------
1922. Trees of New York State, native and naturalized.
N.Y. State Coll. Forestry Tech. Pub. 15. 401 pp., illus.
Syracuse.

(9) Campbell, W. A., and Spaulding, Perley.
1942. Stand improvement of northern hardwoods in relation to diseases in the Northeast. U. S. Forest Serv. Allegheny Forest Expt. Sta. Occas. Paper 5. 34 pp., illus.

(10) Collingwood, G. H.
1945. Knowing your trees.
Amer. Forestry Assoc. 213 pp.. Washington, D. C.

(11) Craighead, F. C.
1950. Insect enemies of eastern forests.
U. S. Dept. Agr. Misc. Pub. 657. 679 pp., illus.

(12) Curtis, J. T., and McIntosh, R. P.
1951. An upland forest continuum in the prairie-forest border region of Wisconsin. Ecology 32: 476-496.

(13) Davidson, Ross W., and Campbell, W. A.
1943. Decay in merchantable black cherry on the Allegheny National Forest. Phytopath. 33: 965-985.

(14) Deters, M. E.
1943. Silvicultural aspects of woodland management in southwestern Minnesota. Univ. Minn. Tech. Bul. 157, 76 pp.

(15) Downs, A. A.
1938. Glaze damage in the birch-beech-maple-hemlock type of Pennsylvania and New York. Jour. Forestry 36: 63-70.

(16) Geiger, Rudolf.
1950. The climate near the ground.
Ed. 2, 482 pp., illus. (Trans. from the German by Milroy N. Stewart and others.) Harvard Univ. Press.

(17) Grimm, William C.
1950. The trees of Pennsylvania.
363 pp., illus. New York and Harrisburg.

(18) Grisez, Ted.
1957. A forester's report on deer-browsing in the Poconos.
Pa. Game News 28 (2): 7-10, illus.

(19) Hamilton, J. M., Szkolnik, M., and Sondheimer, E.
1956. Systemic control of cherry leaf-spot fungus by foliar sprays of actidione derivatives. Science 123 (3209): 1175-1176.

(20) ---------- and Szkolnik, Michael.
1958. Standard and new fungicides for the control of apple scab and cherry leaf-spot. N. Y. Hort. Soc. Ann. Proc. 1958: 72-78.

(21) Hamilton, William J., Jr.
1943. The mammals of eastern United States--an account of recent land mammals occurring east of the Mississippi. 432 pp., illus. Ithaca, N. Y.

(22) Harlow, W. M., and Harrar, E. C.
1937. Textbook of dendrology covering the important forest trees of the United States and Canada. Ed. 2, 542 pp., illus. New York.

(23) Heit, C. E.
1938. Additional data on black cherry germination.
N. Y. Conserv. Dept. Notes on Forest Invest. 16, Albany.

(24) Higgins, B. B.
1919. Gum formation with special reference to cankers and decays of woody plants. Ga. Agr. Expt. Sta. Bul. 127: 23-59, illus.

(25) Hough, A. F.
1936. Epicormic branching of Allegheny hardwoods.
U. S. Forest Serv., Allegheny Forest Expt. Sta. Tech. Note 10. 2 pp.

(26) ----------
1936. A climax forest community on East Tionesta Creek in northwestern Pennsylvania. Ecology 17: 9-28.

(27) ----------
1937. A study of natural tree reproduction in the beech-birch-maple hemlock type. Jour. Forestry 35: 376-378.

(28) ----------
1937. Why timber stand improvement?
Jour. Forestry 35: 813-822.

(29) ----------
1940. Longevity of black cherry in Pennsylvania.
Pa. Forestry Assoc. Forest Leaves 30:16.

(30) ----------
1943. Methods of harvesting sawtimber from forests in the high plateau section of Pennsylvania. Jour. Forestry 41: 898-903, illus.

(31) ---------- and Forbes, R. D.
1943. The ecology and silvics of forests in the high plateaus of Pennsylvania. Ecol. Mono. 13: 299-320.

(32) ----------
1945. Frost pocket and other microclimates in forests of the northern Allegheny Plateau. Ecology 26: 235-250.

(33) ---------- and Taylor, R. F.
1946. Response of Allegheny northern hardwoods to partial cutting. Jour. Forestry 44: 30-38.

(34) ----------
1946. Improvement of second growth northern hardwoods by cordwood thinnings. U. S. Forest Serv. Northeast. Forest Expt. Sta. Forest Mangt. Note 1. 4 pp.

(35) ----------
1949. Deer and rabbit browsing and available winter forage in Allegheny hardwood forests. Jour. Wildlife Mangt. 13 (1): 135-141, illus.

(36) ----------
1951. Tree roots.
Pa. Forests 36 (346): 22-26.

(37) ----------
1953. Preliminary recommendations for the management of black cherry on the northern Allegheny Plateau. Jour. Forestry 51: 184-188.

(38) ----------
1959. Zoning for the management of black cherry on the Allegheny Plateau. Jour. Forestry 57: 353-357.

(39) Hough, Romeyn B.
1921. Handbook of the trees of the northern states and Canada east of the Rocky Mountains. Ed. 3, 470 pp., illus. Lowville, N. Y.

(40) Husch, Bertram.
1954. The regeneration of Prunus serotina in northwestern Pennsylvania following cutting. Ecology 35: 11-17.

(41) Illick, Joseph S.
1928. Pennsylvania trees.
Pa. Dept. Forests and Waters Bul. 11, Ed. 5. 237 pp., illus.

(42) Inman, R. E., and Weihing, J. L.
1959. Cyprex: A superior control for shothole disease of chokecherry. Nebraska Agr. Expt. Sta. Jour. Series Paper 944. Also in U. S. Forest Serv. Tree Planters' Notes 37: 27-30.

(43) Jemison, George M.
1949. Timber stand improvement in the southern Appalachian Region. U. S. Dept. Agr. Misc. Pub. 693. 80 pp.

(44) Kelsey, H. P., and Dayton, W. A.
1942. Standardized plant names.
Ed. 2, 675 pp. Harrisburg, Pa.

(45) Little, Elbert L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dept. Agr. Handbook 41. 472 pp.

(46) Martin, A. C., Zim, H. S., and Nelson, A. L.
1951. American wildlife and plants.
500 pp., illus. New York.

(47) McVaugh, Rogers.
1951. A revision of the North American black cherries (Prunus serotina Ehrh., and relatives). Brittonia 7 (4): 279-315.

(48) ----------
1952. Suggested phylogeny of Prunus serotina and other wide-ranging phylads in North America. Brittonia 7 (5): 317-346.

(49) Morey, H. F.
1931. Climatological charts for the Allegheny forest region.
U. S. Dept. Agr. Mo. Weather Rev. 59: 18-28.

(50) Muenscher, Walter C.
1939. Poisonous plants of the United States.
266 pp., illus. New York.

(51) Northeastern Forest Experiment Station.
1956. The Tionesta natural and scenic areas.
22 pp., illus. Upper Darby.

(52) Ostrom, C. E.
1937. Tree form and defects in young beech-birch-maple-hemlock stands. U. S. Forest Serv., Allegheny Forest Expt. Sta. Tech. Note 14. 2 pp.

(53) ----------
1938. Clear cutting of young northern hardwood stands.
Jour. Forestry 36: 44-49.

(54) Panshin, A. J., Harrar, E. S., Baker, W. J. and Proctor, P. B.
1950. Forest products--their sources, production, and utilization. Ed. 1, 549 pp., illus. New York.

(55) Peattie, Donald C.
1950. A natural history of trees of eastern and central North America. 606 pp., illus. Boston.

(56) Pool, Raymond J.
1919. Handbook of Nebraska trees--A guide to the native and most important introduced species. Univ. Neb. Conserv. and Soil Survey Bul. 7. 171 pp., illus.

(57) Rankin, W. H.
1933. Wound gums and their relation to fungi. Natl. Shade Tree Conf. Proc. 9: 111-115.

(58) Rehder, Alfred.
1940. Manual of cultivated trees and shrubs hardy in North America, exclusive of the sub-tropical and warmer temperate regions. Ed. 2, 996 pp., illus. New York.

(59) Sargent, C. S.
1926. Manual of the trees of North America (exclusive of Mexico). Ed. 2, 910 pp., illus. Boston & New York.

(60) Society of American Foresters, Committee on Forest Types.
1954. Forest cover types of North America (exclusive of Mexico). 67 pp. Washington, D. C.

(61) Thimann, K. V., and Behnke-Rogers, Jane.
1950. The use of auxins in the rooting of woody cuttings. Maria Moors Cabot Foundation Pub. 1. 344 pp. Petersham, Mass.

(62) Thornthwaite, C. W.
1948. An approach toward a rational classification of climate. Geog. Rev. 38: 55-94, illus.

(63) Toumey, James W.
1916. Seeding and planting in the practice of forestry. Ed. 1, 455 pp., illus. New York.

(64) ---------- and Korstian, Clarence F.
1942. Seeding and planting in the practice of forestry. Ed. 3. 520 pp., illus. New York.

(65) United States Bureau of the Census.
1949. Census of manufactures 1947. Lumber and timber basic products. U. S. Dept. Commerce Bur. Census, MC 24 A. 21 pp.

(66) United States Department of Agriculture.
1938. Soils and men. U. S. Dept. Agr. Yearbook. 1232 pp., illus.

(67) ----------
1941. Climate and man. U. S. Dept. Agr. Yearbook. 1248 pp., illus.

(68) ----------
1949. Trees. U. S. Dept. Agr. Yearbook. 944 pp., illus.

(69) United States Forest Service.
1948. Woody-plant seed manual. U. S. Dept. Agr. Misc. Pub. 654. 416 pp., illus.

(70) United States Forest Products Laboratory.
1955. Wood handbook.
Basic information on wood as a material of construction with data for its use in design and specification. U.S. Dept. Agr. Handbook 72. 528 pp., illus.

(71) Van Dersal, W. R.
1938. Native woody plants of the United States, their erosion-control and wildlife values. U. S. Dept. Agr. Misc. Pub. 303. 362 pp., illus.

(72) Westveld, R. H.
1929. Seedlings and sprouts have different value.
Mich. State Coll. Quart. Bul. 12: 7-9.

(73) Whittaker, R. H.
1956. Vegetation of the Great Smoky Mountains.
Ecol. Mono. 26: 1-80.

(74) Wilde, S. A.
1940. Classification of gley soils for the purpose of forest management and reforestation. Ecology 21: 34-44, illus.

AGRICULTURE-FOREST SERVICE-UPPER DARBY

These Silvical Papers...

This is one of a series of 15 silvical papers to be published by the Northeastern Forest Experiment Station. The series will include papers on the following species:

*Green ash
*White ash
Beech
Paper birch
*Sweet birch
*Yellow birch
*Black cherry
Red maple
*Balsam fir
*Red spruce
*Eastern hemlock
Eastern white pine
*Pitch pine
*Virginia pine
*Atlantic white-cedar

*Already published.


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE