Prunus serotina Ehrh. **Black Cherry**

Rosaceae Rose family

David A. Marquis

Black cherry *(Prunus serotina)*, the largest of the native cherries and the only one of commercial value, is found throughout the Eastern United States. It is also known as wild black cherry, rum cherry, and mountain black cherry. Large, high-quality trees suited for furniture wood or veneer are found in large numbers in a more restricted commercial range on the Allegheny Plateau of Pennsylvania, New York, and West Virginia (36,441. Smaller quantities of high-quality trees grow in scattered locations along the southern Appalachian Mountains and the upland areas of the Gulf Coastal Plain. Elsewhere, black cherry is often a small, poorly formed tree of relatively low commercial value, but important to wildlife for its fruit.

Habitat

Native Range

Black cherry (figs. 1, 2) grows from Nova Scotia and New Brunswick west to Southern Quebec and Ontario into Michigan and eastern Minnesota; south to Iowa, extreme eastern Nebraska, Oklahoma, and Texas, then east to central Florida. Several varieties extend the range: Alabama black cherry (var. *alabamensis)* is found in eastern Georgia, northeastern Alabama, and northwest Florida with local stands in North and South Carolina; escarpment cherry (var. *eximia*) grows in the Edwards Plateau region of central Texas; southwestern black cherry (var. *rufula)* ranges from the mountains of Trans-Pecos Texas west to Arizona and south into Mexico; capulin black cherry (var. *salicifolia)* is native from central Mexico to Guatemala and is naturalized in several South American countries.

Climate

Black cherry and its varieties grow under a wide range of climatic conditions. In the heart of the commercial range on the Allegheny Plateau of Pennsylvania and New York, the climate is cool, moist, and temperate with average annual precipitation of 970 to 1120 mm (38 to 44 in) well distributed throughout the year. Summer precipitation averages 510 to 610 mm (20 to 24 in), and the frost-free growing season is 120 to 155 days. Winter snowfalls average 89 to 203 cm (35 to 80 in), and 45 to 90 days have snow cover of 2.5 cm (1 in) or more. Mean annual potential evapotranspiration approximates 430 to 710 mm (17 to 28 in), and mean annual water surplus is 100 to 610 mm (4 to 24 in). January temperatures average a maximum of 1" to 6" C (34" to 43" F) and a minimum of -11" to -6" C (12° to 22" F). July temperatures average a maximum of 27" to 29" C (80° to 85" F) and a minimum of 11" to 16" C (52" to 60" F) (42).

Soils and Topography

Throughout its range in eastern North America, black cherry grows well on a wide variety of soils if summer growing conditions are cool and moist. In Canada it grows near sea level, whereas in Appalachian coves it exists at elevations up to 1520 m (5,000 ft) or more (36). Best development occurs on the Allegheny Plateau at elevations of 300 to 790 m (1,000 to 2,600 ft).

On the Allegheny Plateau, black cherry develops well on all soils except for the very wettest and very driest (36). There seem to be no major changes in site quality between soils developed from glacial till and those of residual origin. Black cherry tolerates a wide range of soil drainage. It grows about the same on well-drained sites as on somewhat poorly drained sites but shows rapid loss in productivity with increasingly wetter conditions *(6,12).* The dry soils of ridge tops and of south- and west-facing slopes are less favorable for black cherry than the moist soils of middle and lower slopes on north and east exposures *(15,36)* though these effects are much less pronounced on the Allegheny Plateau than in the steep topography of the Appalachians.

Though great diversity exists, most of the forest soils important to black cherry are very strongly acid, relatively infertile, and have high, coarse fragment content throughout their profile. Kaolinite is the dominant clay mineral and is responsible for relatively low cation exchange properties *(14).* The bulk of the upland soils have textures that range from sandy loam to silty clay loam, and many soils have developed fragipans that impede drainage and restrict root growth *(6,12,59).* The large majority of upland soils are classified as Inceptisols or Ultisols according to present taxonomy, but Alfisols are also frequently present in colluvial landscape positions *(59,75).*

The author is Principal Research Silviculturist, Northeastern Forest Experiment Station, Radnor, PA.

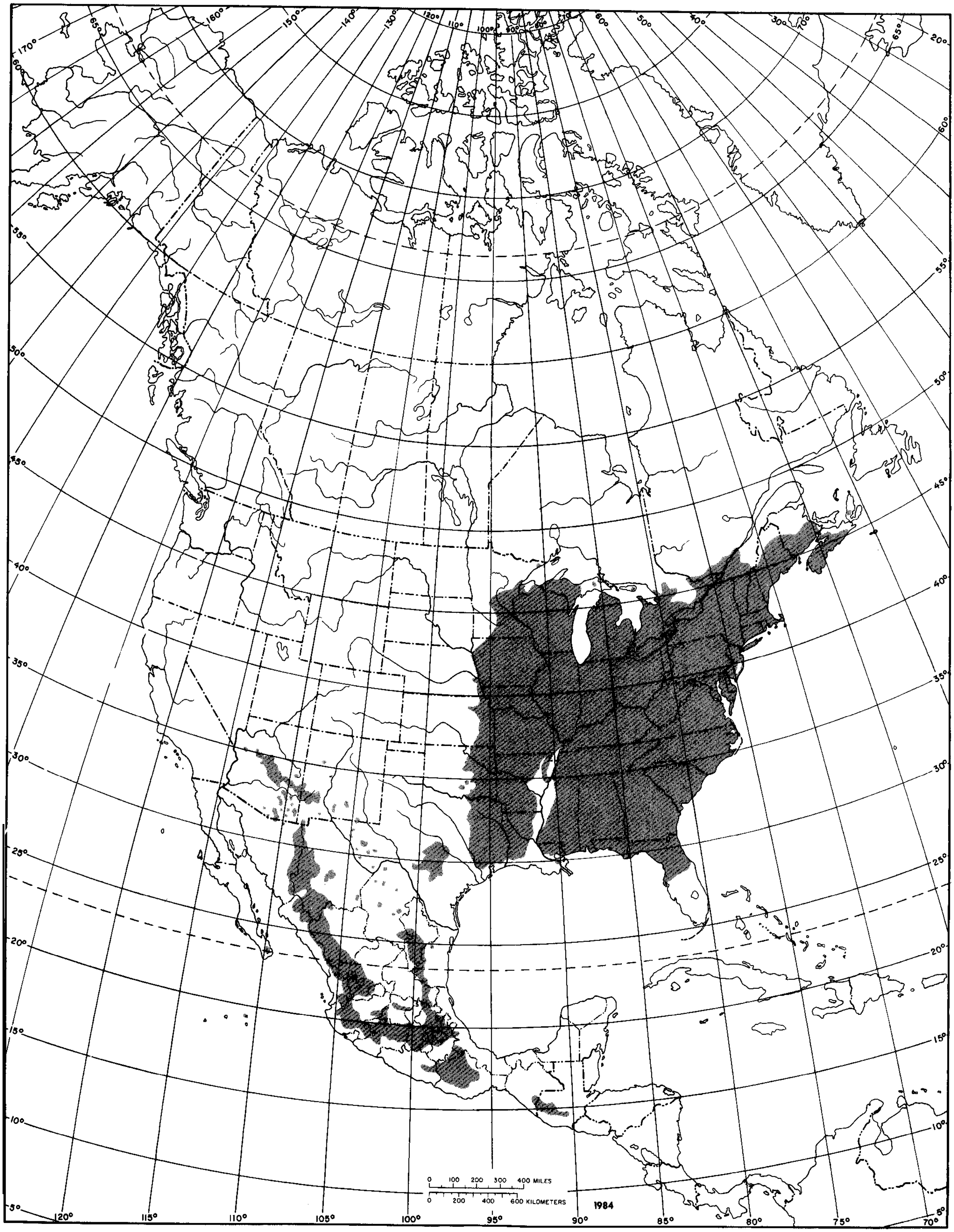

Figure ***l-The*** native ***range*** *of* ***black cherry.***

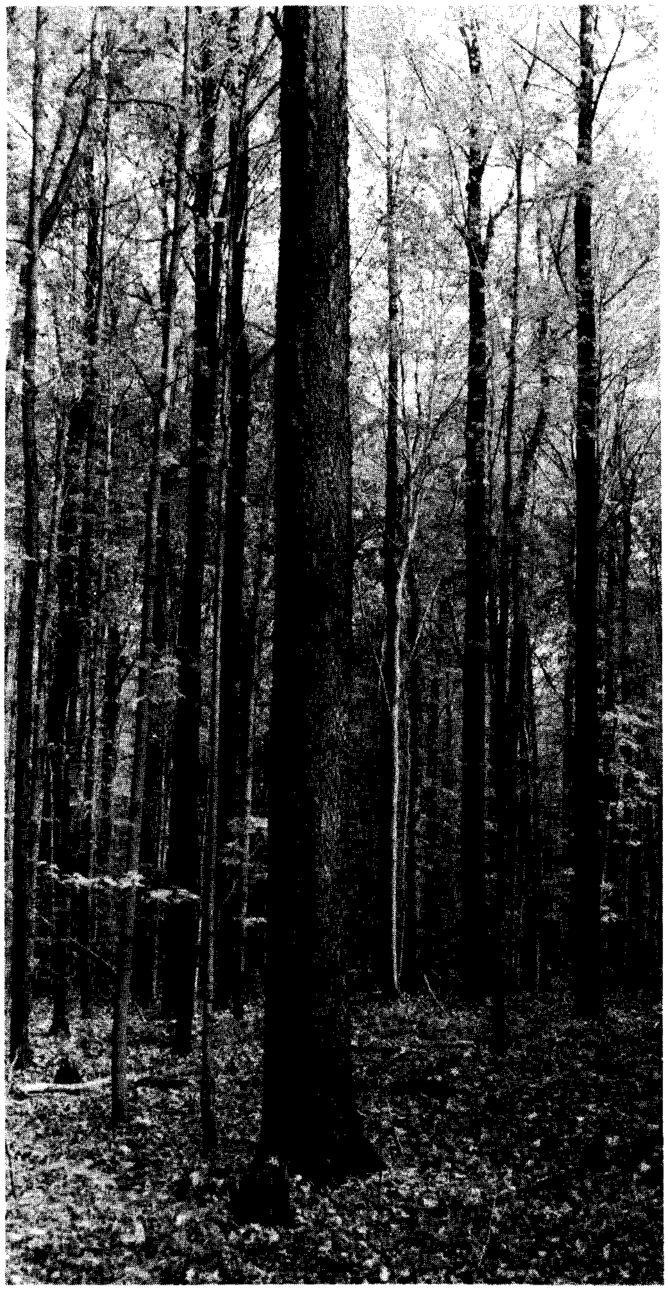

Figure 2—*Black cherry.*

Further southward throughout the Appalachian Highlands, black cherry generally grows on good to excellent sites as a scattered individual in association with other mesophytic hardwoods *(36,74)*, and sometimes in nearly pure stands at high elevations on soils with impeded drainage. In the Lake States, black cherry prefers deep, well-drained soils and is adversely affected by increasingly poorer soil drainage (9).

Associated Forest Cover

Throughout the eastern United States, black cherry is a component of many forest cover types ***(18).*** It is primarily a northern hardwood species, occurring as a common associate in most cover types of this group. Northern hardwood stands that contain large amounts of black cherry are recognized as a separate type: Black Cherry-Maple (Society of American Foresters Type 28) is found in the Allegheny Plateau and Allegheny Mountain sections of Pennsylvania, New York, Maryland, and West Virginia.

Black cherry is also found as a minor component of pine and hemlock types and other northern hardwood types in the Northern Forest Region, as well as upland oaks and other central types in the Central Forest Region. Black cherry is mentioned as a component of the following types:

14	Northern Pin Oak
17	Pin Cherry
19	Gray Birch-Red Maple
20	White Pine-Northern Red Oak-Red Maple
21	Eastern White Pine
22	White Pine-Hemlock
23	Eastern Hemlock
25	Sugar Maple-Beech-Yellow Birch
28	Black Cherry-Maple
31	Red Spruce-Sugar Maple-Beech
43	Bear Oak
44	Chestnut Oak
51	White Pine-Chestnut Oak
52	White Oak-Black Oak-Northern Red Oak
55	Northern Red Oak
57	Yellow-Poplar
59	Yellow-Poplar-White Oak-Northern Red Oak
60	Beech-Sugar Maple
64	Sassafras-Persimmon
108	Red Maple
109	Hawthorn
110	Black Oak

Other tree associates of black cherry in addition to those mentioned in the type names include white ash ***(Fraxinus americana),*** cucumbertree ***(Magnolia** acuminata)*, sweet birch *(Betula lenta)*, American basswood *(Tilia **americana),*** butternut *(Juglans cinerea)*, scarlet oak *(Quercus coccinea)*, balsam fir *(Abies balsamea)*, quaking and bigtooth aspens *(Populus **tremuloides*** and ***P. grandidentata),*** American elm and rock elm *(Ulmus **americana*** and *U. thomasii)*. Important small tree associates include striped maple *(Acer **pensylvanicum),*** pin cherry *(Prunus **pensylvanica),*** eastern hophornbean *(Ostrya **virginiana),*** American hornbeam *(Carpinus **caroliniana),*** and downy serviceberry ***(Amelanchier** arborea)*. Shrubs common in forest stands that contain significant amounts of black cherry include witch-hazel *(Hamamelis virginiana)*, hobblebush *(Viburnum alnifolium),* and various other viburnums. Hay-scented fern *(Dennstaedtia punctilobula)*, *New* York fern *(Thelypteris noveboracensis),* short-husk grass *(Bracheylytrum erectum),* violets *(Viola* spp.), wood sorrel *(Oxalis* spp.), asters *(Aster* spp.), and club mosses *(Lycopodium* spp.) are also prevalent in the understory in many areas.

Life History

Reproduction and Early Growth

Flowering and Fruiting-Unlike domestic cherries, which flower before the leaves appear, black cherry flowers late in relation to leaf development. At the latitude of 41" to 42" N. in Pennsylvania and New York, black cherry flowers usually appear around May 15 to May 20. At that time, the leaves are nearly full-grown though still reddish in color (36). Flower development in other parts of the range varies with climate-from the end of March in Texas to the first week of June in Quebec, Canada.

Black cherry flowers are white, solitary, and borne in umbel-like racemes. The flowers are perfect and are insect pollinated (22). Several species of flies, a flower beetle, and several species of bees, including the honey bee, work the blossoms for pollen and nectar. Self-pollination has been observed, but none of the self-pollinated flowers developed into viable seeds *(21).*

Late spring frosts may damage the flowers before they open, and frosts occasionally cause large numbers of newly set fruits to fall from the pedicels without maturing (36). Premature dropping of green fruits is also a problem in some years. The fruit is a one-seeded drupe about 10 mm (0.38 in) in diameter with a bony stone or pit. The fruit is black when ripe.

Seed Production and Dissemination-Limited flowering of black cherry seedlings in a seed orchard has been observed a few years after planting (5). Viable seeds have been produced on open-grown seedlings or sprouts as young as 10 years of age and on trees as old as 180 years. However, the period of maximum seed production in natural stands is generally between 30 and 100 years of age (36). Some individual trees never produce significant quantities of seed even when they reach an age and crown position where it is expected.

In most stands of seed-bearing age, some seeds are produced nearly every year. Good crops occur at intervals of 1 to 5 years across the geographic range of black cherry; on the Alleghany Plateau of northwestern Pennsylvania, good crops have occurred about every other year *(7,23).* On the Allegheny Plateau, fruit ripening and seedfall occur between August 15 and mid-September; the time is earlier in the southern range and later in the northern range. In the southeastern United States, fruits ripen in late June and seedfall is complete by early July. There may be as much as 3 weeks difference in fruit maturation dates between trees growing in the same stand.

Cleaned black cherry seeds range from 6,800 to 17,900/kg (3,100 to 8,100/lb), averaging 10,600/kg (4,800/lb). Seed weight varies geographically, with larger seeds in the northwest range and smaller seeds in the south and east.

The bulk of the seed crop falls to the ground in the vicinity of the parent tree. Circles of advance seedlings beneath scattered cherry trees and an absence of seedlings elsewhere are common occurrences in closed stands. As a result, the amount of black cherry advance reproduction is highly dependent on the number and distribution of seed-producing trees in the overstory (7). Songbirds distribute modest quantities of seeds in their droppings or by regurgitation. Omnivorous mammals, such as foxes and bears, also distribute seeds in their droppings. Bird and mammal distribution often accounts for a surprising abundance of advance cherry seedlings in stands lacking cherry seed producers.

Seedling Development-Black cherry seeds require a period of after-ripening before germination will take place (22). Under natural conditions, this occurs during winter months in the forest floor. The usual pattern is for seeds of 1 year's crop to germinate over the following 3 or more years *(45,77).* Because of frequent seed crops and delayed germination, often a considerable quantity of viable cherry seeds is stored in the forest floor beneath cherry stands, freeing natural regeneration from dependency on current seed production (45).

At the time of germination, the endosperm swells and splits the stone into two halves. Contrary to some beliefs, germination does not depend upon splitting of the seed coat by frost, or partial decomposition of the bony seed coat by soil organisms, or being passed through the digestive tract of birds. Germination is hypogeous; that is, the cotyledons remain below the soil surface (22).

Seedbed requirements for germination are not rigid. Mineral soil is not required. In fact, germination is somewhat less on mineral soil than on undisturbed humus or leaf litter *(37,43).* Few seeds germinate in areas that have had the organic horizons stripped off or that are compacted by logging machinery. A moist seedbed is required for good germination, and burial of seeds to a depth of several inches is beneficial, apparently because it provides a stable moisture supply. Shade also improves germination by helping to maintain stable moisture. Germination is best beneath a canopy that represents 60 percent stocking or more, and germination decreases at lower canopy densities and is poorest in full sunlight *(43,47)*.

Under a forest canopy, myriads of cherry seedlings start in the vicinity of seed trees practically every year. Many of these survive 3 or 4 years even under the dense shade of an uncut stand, but few grow to be more than 12 or 15 cm (5 or 6 in) tall or survive more than 5 years under that low level of light. Nevertheless, those that die are quickly replaced by newly germinated seedlings, so a fairly dense understory of small black cherry seedlings is often present under seed-producing stands of black cherry. Where canopy density has been reduced by partial cutting, cherry advance seedlings survive longer and grow taller in response to the higher level of light *(47,49)*. Overstory stocking levels of 50 to 70 percent provide optimum conditions for establishment of black cherry advance reproduction (48). Good germination and high survival provide for maximum seedling numbers at this level, and seedling heights of 0.3 to 0.6 m (1 to 2 ft) are achieved in about 5 years. Best height growth of established seedlings, however, occurs in full sunlight *(43,49)*.

Black cherry seedlings reach a height of 5 to 10 cm (2 to 4 in) within 30 days of germination. Under dense shade they do not grow much more, averaging less than 3 cm (1 in) of growth per year until they die because of lack of light. In the open, cherry stems have the potential to grow faster than most associated species. Juvenile height growth often averages 46 cm (18 in), and a few individuals may grow 91 cm (36 in) or more per year. With fertilization, annual terminal growth of 1.2 to 1.8 m (4 to 6 ft) is common; growth of up to 2.4 m (8 ft) per year has been observed on some trees *(1)*.

Seedlings typically develop a taproot with numerous laterals during the first few years. Under adequate light, the roots penetrate 15 to 20 cm (6 to 8 in) the first year in most soils. Well before black cherry reaches sapling size, a spreading form of root system develops in which a distinct taproot is no longer evident (36).

Black cherry advance seedlings more than 15 cm (6 in) tall and at least 2 years old survive well and grow rapidly after exposure to full sunlight. Smaller seedlings survive in somewhat lower numbers, but they can be important sources of regeneration too. Smaller seedlings survive better if they grow under a partially cut canopy before release rather than under an uncut canopy (53).

A two-cut shelterwood sequence provides the best conditions for the establishment and subsequent growth of black cherry regeneration. The seed cut should reduce the overstory to 50 or 60 percent relative density to provide for establishment of a large number of seedlings of modest size. A removal cut 5 to 10 years later releases the established seedlings for rapid growth and development (49). In some stands, adequate numbers of advance seedlings are present naturally, and the overstory removal or clearcut can be made without an earlier seed cut *(25)*. The presence of advance seedlings is critical, however, and clearcutting may not regenerate cherry in stands where advance seedlings are lacking, especially where deer browsing, interfering plants, or other factors limit reproduction *(55,56)*.

Some black cherry seedlings do become established after removal cutting, and these supplement those that originated as advance seedlings. But direct exposure to sunlight is not conducive to best germination. For this reason, small clearcut patches or strips often provide better regeneration than large block clearcuts *(36)*, except where advance seedlings are adequate by themselves.

In stands where all species start at the same time, cherry quickly overtops tolerant species *(51)*. Under partial shade, however, height growth of cherry is often less than that of its tolerant associates *(48)*, and cherry is far less likely to grow into the main canopy through small gaps created by removal of a single tree. As a result, single-tree selection cutting generally discriminates against black cherry reproduction (46).

Vegetative Reproduction-Black cherry readily sprouts from stumps and the sprouts grow rapidly, especially in full sunlight. Small, suppressed seedlings that have been released from overhead shade but which are bent or broken by logging operations will produce well-formed sprouts from the root collar (63). These seedling sprouts are an important and highly desirable source of regeneration. Even large old stumps sometimes are capable of sprouting; a 258-year-old, 122-cm (48-in) d.b.h. black cherry sprouted when cut. Maximum sprouting occurs in trees less than 40 or 50 years of age however. Clearcuttings of very young second growth cherry stands has resulted in third growth cherry stands in which more than half of the trees were of sprout origin (36).

Sprouts of cherry tend to have poorer form than comparable seedlings but grow faster than seedlings during the first 20 to 30 years. Although trees of seedling or seedling-sprout origin are preferred for timber production, usually several stems of each sprout clump are capable of growing into high-quality sawtimber *(41,78)*. The incidence of butt rot from the parent stump is not as great in black cherry sprouts from stumps as large as 25 cm (10 in) in diameter or from stumps that have been overgrown by their sprouts by 35 years of age *(8)*. Thus, sprouts of good form originating low on the stump are not discriminated against in silvicultural operations.

Sapling and Pole Stages to Maturity

Growth and Yield-Black cherry grows very fast in the seedling, sapling, and pole stages, generally outgrowing and overtopping common associates such as sugar maple and beech. This gives rise to even-aged stands that are distinctly stratified into crown layers and diameters based on species. Black cherry generally occupies the dominant and codominant crown strata, while sugar maple and beech occupy an intermediate or suppressed crown position. Where present, species of intermediate tolerance such as red maple and white ash tend to be intermediate in crown position and size between the cherry and the sugar maple and beech. In stands where tolerant sugar maple and beech are present in the dominant crown positions alongside black cherry, the tolerants are often residuals of the previous stand that had a distinct head start on the cherry *(51)*.

Black cherry maintains its growth advantage over associated species for 60 to 80 years, so the proportion of the basal area or volume in cherry tends to increase over time- in mixed stands. By age 60, codominant red maple diameter growth is often as good as or better than that of codominant cherry. Beyond age 80 to 100 years, diameter growth slows, mortality of cherry increases rapidly, and the importance of the species in the stand declines. However, few stands of such age are available to judge the rapidity with which cherry disintegrates at advanced ages. Site index curves for black cherry on the Allegheny Plateau have recently been developed (2).

Average annual diameter growth of black cherry dominants and codominants might be 0.65 cm (0.25 in) between ages 10 and 40 years, 0.5 cm (0.20 in) between ages 40 and 70 years, and 0.4 cm (0.15 in) between ages 70 and 100 years.

Growing space requirements for black cherry are considerably lower than for the associated species (except for hemlock) *(71)*. Thus, stands containing a high percentage of black cherry carry more basal area and more volume per acre than stands with a low percentage of cherry. For example, full stocking for stands with a quadratic average stand diameter of 25 cm (10 in) is 31.7 m^2 of basal area per hectare (138 ft^2/acre) if there is 20 percent cherry, and 42.2 m^2 (184 ft^2) if there is 80 percent cherry. Maximum stocking also varies with stand diameter. Stocking is 31.7, 37.0, and 40.4 m^2/ha (138, 161, and 176 ft^2/acre) at average quadratic stand diameters of 15, 25, and 35 cm (6, 10, and 14 in), respectively, for stands with 50 percent cherry *(67,72)*.

Rooting Habit-The root system of black cherry is predominantly spreading and shallow, even in well-drained soils. Most roots are restricted to the upper 60 cm (24 in) of soil or less, with occasional sinker roots extending to depths of 90 to 120 cm (36 to 48 in). On wet sites, the tendency toward shallow rooting is especially pronounced. Because of this tendency to grow taller than associated species in mixed stands, cherry is vulnerable to windthrow, especially on poorly drained soils and at older ages (36).

Reaction to Competition-Black cherry is classed as intolerant of shade. Although black cherry seedlings are common under uncut stands and survive for 3 to 5 years, they do not live for extended periods or move up into larger size classes without moderate to heavy opening of the overstory canopy

In sapling and larger sizes, black cherry trees are considered very intolerant of competition. Cherry trees are found primarily in the dominant and codominant crown classes. Those individuals that drop to lower crown levels decline in growth and soon die. Thus, diameter distribution of black cherry 'in even-aged stands follows the bell-shaped curve typical of intolerant species (51).

Black cherry dominants and codominants respond to thinning with slight to moderate increases in diameter growth, especially at ages up to 50 or 60 years *(17,36,54)*. But thinning does not generally produce a response in trees that have been suppressed. Even early thinnings and cleanings intended to elevate intermediate or suppressed cherry to codominate crown positions generally have failed *(13,73)*.

Even-aged silviculture best satisfies the silvical requirements for black cherry regeneration,' using either clearcutting where advance seedlings are already present or shelterwood cutting to develop them where they are absent *(56,58)*. Advance seedlings and seed stored in the forest floor generally make retention of seed trees unnecessary. Uneven-aged silviculture, especially single-tree selection, tends to gradually eliminate cherry from the stands, because cherry does not move up into the dominant canopy without at least moderate levels of sunlight (46). Group selection cutting might maintain small percentages of cherry in uneven-aged stands, though this has never been demonstrated clearly.

Damaging Agents-The most important defoliating insects attacking black cherry include the eastern tent caterpillar *(Malacosoma americanum)* and the cherry scallop shell moth *(Hydria prunivorata)* (3). Infestations of these insects are sporadically heavy, with some apparent growth loss and occasional mortality if heavy defoliations occur several years in a row.

Attacks by numerous species of insects cause gum defects in black cherry, resulting in reduced timber quality. Gum spots in the wood are often associated with the Agromyzid cambium miner *(Phytobia pruni),* the peach bark beetle *(Phloeotribus liminaris)*, and by the lesser Peachtree borer *(Synathedon pictipes) (35,40,66).* A wide variety of insects can cause injury to terminal shoots of black cherry seedlings and saplings, resulting in stem deformity. *Archips* spp. and *Contarinia cerasiserotinae* are among the more important (64).

The most common disease is cherry leaf spot caused by *Coccomyces lutescens* (36). Large numbers of black cherry seedlings are sometimes weakened or killed by this disease. Repeated attacks reduce the vigor of larger trees. Most other foliage diseases cause little damage.

Black knot, a native disease caused by the fungus *Apiosporina morbosa* is common on black cherry (27). It causes elongated rough black swellings several times the diameter of the normal stem. Small twigs may be killed within a year after infection. Large cankerous swellings, a foot or more in length, may occur on the trunks of larger trees, and where several such lesions are scattered along the bole, the tree is worthless for lumber. *Cytospora leucostoma* is the cause of a canker disease responsible for widespread branch mortality of black cherry in Pennsylvania (26). Common infection courts are decaying fruit racemes and bark fissures caused by excessive gum production following passage of the larvae of *Phytobia pruni,* a cambium mining insect.

Several basidiomycete fungi that cause root and butt rot of living black cherry trees include *Armil-Zaria mellea, Coniophora cerebella, Polyporus berkeleyi,* and *Tyromyces spraguei.* Many other fungi cause decay of the main trunk; these include *Fomes fomentarius, Fomitopsis pinicola, Poria prunicola. P. mutans,* and *Laetiporus sulphureus (29,36).* Damage caused by glaze storms exposes black cherry to infection by top-rot fungi (16).

Porcupines girdle and kill black cherry trees and also consume bark, thereby providing entry points for fungi. Meadow mice and meadow voles girdle the stem near the ground (37). Such damage where grass or other herbaceous cover provides suitable habitat for the mice is probably one of the major causes of planting failure in unregenerated clearcuts and old fields.

White-tailed deer, rabbits, and hare feed on black cherry seedlings (36). In parts of Pennsylvania, deer browsing is the most serious problem of black cherry. Reproduction sometimes is completely eliminated by browsing, and most regeneration cuts are affected by reduced stocking, delays in establishment, and shifts in species composition toward less palatable beech and striped maple *(50,57).* Damage is dramatic after clearcutting, but damage to advance reproduction also is important.

In areas of high deer population such as Pennsylvania, successful reproduction can be assured only where advance seedlings are so abundant that deer cannot eat all of them in the few years required for them to grow out of reach (55,571. Black cherry fares somewhat better than associated species such as sugar maple, red maple, white ash, and yellow-poplar, which are preferred deer browse. Where successful regeneration develops after clearcutting in this region, it is often nearly pure black cherry. Guidelines and techniques for regenerating stands with black cherry have been developed *(56,58).*

Cherry is somewhat more vulnerable to storm damage than many of its associates because it often towers above the general canopy in mixed stands. Sapling and pole-sized trees are frequently bent by glaze or wet snow, causing loss of the leader and severe crooks that make them unsuitable for sawtimber. Cherry trees make remarkable recovery after breakage, however, with little loss of diameter growth. Decay spreads more slowly in cherry than in some of the associated species, so long-term effects are less severe than they seem to be at first *(36,65).*

Cherry trees of all sizes are highly susceptible to fire injury. Even large trees are killed by moderate to severe fire, but most resprout unless the fire was unusually hot. Black cherry is intolerant of flooding. Of 39 species studied in a Tennessee flood test, black cherry was the most sensitive to high water (28).

Certain herbaceous plants interfere with establishment of black cherry regeneration through an allelopathic mechanism. Flat top aster *(Aster umbel-Zatus),* rough stemmed goldenrod *(Solidago rugosa)*, brackenfern *(Pteridium aquilinum)* and wild oatgrass *(Danthonia compressa)* (30) release chemicals from their leaves or roots that sometimes interfere with black cherry growth and development. Woodland fern and grasses may also interfere with black cherry regeneration, through a complex of mechanisms that involve both light and nitrogen effects *(31,34).* Black cherry may interfere with regeneration of other tree species, such as red maple *(32)*, but this has not been investigated thoroughly.

Special Uses

Black cherry fruits are an important source of mast for many nongame birds, squirrel, deer, turkey, mice and moles, and other wildlife. The leaves, twigs, and bark of black cherry contain cyanide in bound form as the cyanogenic glycoside, prunasin (33). During foliage wilting, cyanide is released and domestic livestock that eat wilted foliage may get sick or die (38). Deer eat unwilted foliage without harm (36).

The bark has medicinal properties. In the southern Appalachians, bark is stripped from young black cherries for use in cough medicines, tonics, and sedatives (36,391. The fruit is used for making jelly and wine. Appalachian pioneers sometimes flavored their rum or brandy with the fruit to make a drink called cherry bounce. To this, the species owes one of its names-rum cherry (36).

Genetics

Several varieties of black cherry have been recognized in the southern portion of the range: var. ***alabamensis,*** Alabama black cherry; var. ***eximia, es-*** carpment cherry; var. *rufula*, southwestern black cherry or Gila chokecherry; and var. *salicifolia*, the capulin black cherry (36).

Population Differences

Provenance testing of black cherry has identified several traits that are related to geographic origin. Seed weight seems to exhibit a definite clinal pattern, increasing as latitude increases *(11,60,62).* The largest seeds are found among the northern sources (especially those from Wisconsin); seed weight generally decreases to the south and east *(60).* For example, weight of northwestern Pennsylvania seeds is consistently lower than that of West Virginia seeds (62). Elevation also affects seed weight, with heavier seeds coming from the higher elevations ***(19).*** Differences in stem form, branching habit, and incidence of black knot infection of seedlings have also been observed among seed sources *(10).*

Growth and survival of cherry seedlings are likewise affected by seed source *(4,11,76).* Seedlings from southern sources and lower elevations break dormancy sooner and suffer more severe frost damage than seedlings from northern sources and higher elevations when planted in the North or at higher elevations. Conversely, growth is better from southern sources and lower elevations. An interesting exception seems to be cherry from the heart of the commercial range in northwestern Pennsylvania that outgrew local sources when outplanted in West Virginia during the first 10 years of the USDA Forest Service's tree improvement program.

There is also great variation within sources. Large variation in growth of seedlings within half-sib families is common *(70)*, and open pollinated superior trees have not produced significantly better progeny than average trees ***(61).*** Considerable variations also exist in such attributes as tendency to produce epicormic sprouts when drastically exposed, and time of leaf senescence in the autumn.

Races and Hybrids

The four subspecies or varieties of black cherry mentioned above may be considered as races. There are no recognized interspecific hybrids with black cherry There is one account of controlled hybridization between wild black cherry and one of the varieties-the capulin black cherry *(80).*

There is conflicting evidence on the possibility of polyploidy in black cherry. Most reports indicate that the chromosome number of black cherry is 2n=32, which makes it a tetraploid. However, one report using material from Tennessee indicates the presence of a nontetraploid population there *(20).*

Literature Cited

1. Auchmoody, L. R. 1982. Response of young black cherry stands to fertilization. Canadian Journal of Forest Research 12:319–325.
2. Auchmoody, L. R., and C. 0. Rexrode. 1984. Black cherry site index curves for the Allegheny Plateau. USDA Forest Service, Research Paper NE-549. Northeastern Forest Experiment Station, Broomall, PA. 5 p.
3. Baker, Whiteford L. 1972. Eastern forest insects. U.S. Department of Agriculture, Miscellaneous Publication 1175. Washington, DC. 642 p.
4. Barnett, P. E., and R. E. Farmer, Jr. 1980. Altitudinal variation in juvenile characteristics of southern Appalachian black cherry ***(Prunus*** serotina Ehrh.). Silvae Genetica 29:157–160.
5. Barnett, P. E., and R. E. Farmer, Jr. 1973. Early flowering in cherry: effects of genotype, environment, and chemical growth retardants. *In* Proceedings, Twelfth Southern Forest Tree Improvement Conference. p. 118-124. Southern Forest Experiment Station, New Orleans, LA.

6. Becker, D. D., J. T. Haagen, and W. R. Knight. 1977. Interim soil survey report for Cameron and Elk Counties, Pennsylvania. U.S. Department of Agriculture, Soil Conservation Service, Pennsylvania State University, and Pennsylvania Department of Environmental Resources. 97 p.
7. Bjorkbom, John C. 1979. Seed production and advance regeneration in Allegheny hardwood forests. USDA Forest Service, Research Paper NE-435. Northeastern Forest Experiment Station, Broomall, PA. 10 p.
8. Campbell, W. A. 1938. Preliminary report on decay in sprout northern hardwoods in relation to timber stand improvement. USDA Forest Service, Occasional Paper 7. Northeastern Forest Experiment Station, Broomall, PA. 8 p.
9. Carmean, Willard H. 1979. Site index comparisons among northern hardwoods in northern Wisconsin and upper Michigan. USDA Forest Service, Research Paper NC-169. North Central Forest Experiment Station, St. Paul, MN. 17 p.
10. Cech, Franklin C., and Katherine K. Carter. 1979. Geographic variation in black cherry: ten-year results of a West Virginia provenance test. *In* Proceedings, First North Central Forest Tree Improvement Conference. p. 21-27. North Central Forest Experiment Station, St. Paul, MN.
11. Cech, F. C., and J. H. K&miller, Jr. 1968. Geographic variation in seed and seedling characteristics of black cherry (Prunus *serotina* Ehrh.). *In* Proceedings, Fifteenth Northeastern Forest Tree Improvement Conference. p. 53-60. Northeastern Forest Experiment Station, Upper Darby, PA.
12. Cerutti, James R., and Albert D. Backer. 1971. Warren County Pennsylvania interim soil survey report. U.S. Department of Agriculture, Soil Conservation Service, Pennsylvania State University, and Pennsylvania Department of Environmental Resources. University Park, PA.
13. Church, Thomas W., Jr. 1955. Weeding-an effective treatment for stimulating growth of northern hardwoods. Journal of Forestry 53:717-719.
14. Ciolkosz, E. J., R. W. Ranney, G. W. Peterson, and others, 1970. Characteristics, interpretations, and uses of Pennsylvania soils, Warren County. Pennsylvania State University College of Agriculture, Project Report 306. University Park. 63 p.
15. Davis, D. D., and W. W. Ward. 1966. Site quality evaluation for black cherry. p. 54-56. *In* Pennsylvania State University, Forest Resource Research Briefs 1. University Park.
16. Downs, Albert A. 1938. Glaze damage in the beech-birch-maple-hemlock type of Pennsylvania and New York. Journal of Forestry 36:63-70.
17. Ernst, Richard L. 1987. Growth and yield following thinning in mixed-species Allegheny hardwood stands. *In* Proceedings Symposium, Managing Northern Hardwoods, Ralph D. Nyland, ed., June 23-25, 1986. State University of New York, Syracuse. p. 211-222.
18. Eyre, F. H., ed. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 p.
19. Farmer, Robert E., Jr., and Paul E. Barnett. 1972. Altitudinal variations in seed characteristics of black cherry in the Southern Appalachians. Forest Science 18:169-175.
20. Forbes, Donovan. 1969. Self and cross-incompatibility in black cherry *(Prunus serotina).* Thesis (Ph.D.), University of Florida, Gainesville.
21. Forbes, Donovan. 1973. Problems and techniques associated with natural and controlled pollination of black cherry *(Prunus serotina* Ehrh.). *In* Proceedings, Twentieth Northeastern Forest Tree Improvement Conference. p. 47-51. Northeastern Forest Experiment Station, Upper Darby, PA.
22. Grisez, Ted J. 1974. Prunus L. Cherry, peach, and plum. *In* Seeds of woody plants in the United States. p. 658-673. C.S. Schopmeyer, tech. coord. U.S. Department of Agriculture, Agriculture Handbook 450. Washington, DC.
23. Grisez, Ted J. 1975. Flowering and seed production in seven hardwood species. USDA Forest Service, Research Paper NE-315. Northeastern Forest Experiment Station, Upper Darby, PA. 8 p.
24. Grisez, Ted J. 1978. Pruning black cherry in understocked stands. USDA Forest Service, Research Paper NE-395. Northeastern Forest Experiment Station, Broomall, PA. 9 p.
25. Grisez, Ted J., and Maurice R. Peace. 1973. Requirements for advance reproduction in Allegheny hardwoods-an interim guide. USDA Forest Service, Research Note NE-180. Northeastern Forest Experiment Station, Upper Darby, PA. 5 p.
26. Gross, Henry L. 1967. Cytospora canker of black cherry. Plant Disease Reporter 51:941-944.
27. Gross, Henry L. 1977. Black knot of cherry. Pennsylvania Department of Forest and Waters, Tree Disease Leaflet 2. Harrisburg.
28. Hall, T. F., and G. E. Smith. 1955. Effects of flooding on woody plants, West Sandy dewatering project, Kentucky Reservoir. Journal of Forestry 53:281-285.
29. Hepting, George H. 1971. Diseases of forest and shade trees of the United States. U.S. Department of Agriculture, Agriculture Handbook 386. Washington, DC. 658 p.
30. Horsley, Stephen B. 1977. Allelopathic inhibition of black cherry by fern, grass, goldenrod, and aster. Canadian Journal of Forest Research 7:205-216.
31. Horsley, Stephen B. 1977. Allelopathic inhibition of black cherry. II. Inhibition by woodland grass, ferns, and club moss. Canadian Journal of Forest Research 7:515-519.
32. Horsley, Stephen B. 1979. Decomposition of the cyanogenic glycoside of ***Prunus serotina:*** A possible allelopathic mechanism. (Abstract.1 p. 41. Botanical Society of America, Miscellaneous Publication 157. Columbus, OH.
33. Horsley, Stephen B. 1981. Glucose-1-benzoate and prunasin from ***Prunus serotina.*** Phytochemistry 20:1127-1128.
34. Horsley, Stephen B. 1986. Evaluation of hayscented fern interference with black cherry. Abstract, Proceedings. American Journal of Botany 73:668-669.
35. Hough, A. F. 1963. Gum spots in black cherry. Journal of Forestry 61:572-579.
36. Hough, Ashbel F. 1965. Black cherry *(Prunus serotina* Ehrh.). *In* Silvics of forest trees of the United States. p. 539-545. H. A. Fowells, comp. U.S. Department of Agriculture, Agriculture Handbook 271. Washington, DC.
37. Huntzinger, Harold J. 1967. Seeding black cherry in regeneration cuttings. USDA Forest Service, Research Note NE-63. Northeastern Forest Experiment Station, Upper Darby, PA. 8 p.
38. Kingsbury, J. M. 1964. Poisonous plants of the United States and Canada. Prentice-Hall, Englewood Cliffs, NJ. 626 p.

39. Krochmal, Arnold, Russell S. Walters, and Richard M. Doughty. 1969. A guide to medicinal plants of Appalachia. USDA Forest Service, Research Paper NE-138. Northeastern Forest Experiment Station, Upper Darby, PA. 291 p.

40. Kulman, H. M. 1964. Defects in black cherry caused by barkbeetles and agromizid cambium miners. Forest Science 10:258–266.

41. Lamson, Neil I. 1976. Appalachian hardwood stump sprouts are potential sawlog crop trees. USDA Forest Service, Research Note NE-229. Northeastern Forest Experiment Station, Upper Darby, PA. 4 p.

42. Lull, Howard W. 1968. A forest atlas of the Northeast. USDA Forest Service. Northeastern Forest Experiment Station, Upper Darby, PA. 46 p.

43. Marquis, David A. 1973. The effect of environmental factors on advance regeneration of Allegheny hardwoods. Thesis (Ph.D.), Yale University, New Haven, CT. 147 p.

44. Marquis, David A. 1975. The Allegheny hardwood forests of Pennsylvania. USDA Forest Service, General Technical Report NE-15. Northeastern Forest Experiment Station, Upper Darby, PA. 32 p.

45. Marquis, David A. 1975. Seed germination and storage under northern hardwood forests. Canadian Journal of Forest Research 5:478–484.

46. Marquis, David A. 1978. Application of uneven-aged silviculture and management on public and private lands. *In* Uneven-aged silviculture and management in the United States. Combined Proceedings of two workshops. p. 25-61. USDA Forest Service, General Technical Report WO-24. Timber Management Research, Washington, DC.

47. Marquis, David A. 1978. The effect of environmental factors on the natural regeneration of cherry-ash-maple forests in the Allegheny Plateau region of the eastern United States. *In* Proceedings, Symposium Fevillus Precleux, Nancy, France. p. 90-99. Institute National de la Recherche Agronomique, Champenoux, France.

48. Marquis, David A. 1979. Ecological aspects of shelterwood cutting. *In* Proceedings, National Silviculture Workshop, September 17-21, 1979, Charleston, SC. p. 40-56. USDA Forest Service, Timber Management, Washington, DC.

49. Marquis, David A. 1979. Shelterwood cutting in Allegheny hardwoods. Journal of Forestry 77:140–144.

50. Marquis, David A. 1981. Effect of deer browsing on timber production in Allegheny hardwood forests of northwestern Pennsylvania. USDA Forest Service, Research Paper NE-75. Northeastern Forest Experiment Station, Broomall, PA. 10 p.

51. Marquis, David A. 1981. Even-age development and management of mixed hardwood stands: Allegheny hardwoods. *In* Proceedings, National Silviculture Workshop on Hardwood Management, Roanoke, VA. p. 213-226. USDA Forest Service, Washington, DC.

52. Marquis, David A. 1981. Removal or retention of unmerchantable saplings in Allegheny hardwoods: effect on regeneration after clearcutting. Journal of Forestry 79(5):280–283.

53. Marquis, David A. 1982. Effect of advance seedling size and vigor on survival after clearcutting. USDA Forest Service, Northeastern Forest Experiment Station, Broomall, PA. 7 p.

54. Marquis, David A. 1986. Thinning Allegheny pole and small sawtimber stands. *In* Guidelines for managing immature Appalachian hardwoods: May 28-30, 1986; Morgantown, WV. West Virginia University. p. 68-84.

55. Marquis, David A. 1987. Silvicultural techniques for circumventing deer browsing. *In* Proc.: Deer, Forestry, and Agriculture: Interactions and Strategies for Management. June 15-17, 1987, Warren, Pennsylvania; Plateau and Northern Hardwood Chap., Allegheny Society of American Forestry p. 125-136.

56. Marquis, David A. 1988. Guidelines for regenerating cherry-maple stands. *In* Proc.: Guidelines for Regenerating Appalachian Hardwood Stands; H. Clay Smith, Arlyn W. Perkey, and William E. Kidd, Jr., eds. May 24-26, 1988, Morgantown, WV: West Virginia State Univ. & USDA Forest Service, SAF Publication 88–03:167–188.

57. Marquis, David A., and Ronnie Brenneman. 1981. The impact of deer on forest vegetation in Pennsylvania. USDA Forest Service, General Technical Report NE-65. Northeastern Forest Experiment Station, Broomall, PA. 7 p.

58. Marquis, D. A., R. L. Ernst, and S. L. Stout. 1984. Prescribing silvicultural treatments in hardwood stands of the Alleghenies. USDA Forest Service, General Technical Report NE-96. Northeastern Forest Experiment Station, Broomall, PA. 91 p.

59. Matelski, R. P. 1972. Soil series of Pennsylvania-Catena diagrams. Pennsylvania State University, Agronomy Series 28, 5th ed. University Park. 92 p.

60. Pitcher, John A. 1984. Geographic variation patterns in seed and nursery characteristics of black cherry. USDA Forest Service, Research Paper SO-208. Southern Forest Experiment Station, New Orleans, LA. 8 p.

61. Pitcher, John A. 1982. Phenotype selection and half-sib family performance in black cherry. Forest Science 28:251–256.

62. Pitcher, John A., and Donald E. Dorn. 1972. Geographic source differences noted in black cherry seed weight, germination. Tree Planters' Notes 23(3):7–9.

63. Powell, Douglas S., and E. H. Tryon. 1979. Sprouting ability of advance growth in undisturbed hardwood stands. Canadian Journal of Forest Research 9:116–120.

64. Rexrode, Charles 0. 1978. Stem deformity in black cherry. USDA Forest Service, Research Paper NE-411. Northeastern Forest Experiment Station, Broomall, PA. 6 p.

65. Rexrode, C. O., and L. R. Auchmoody. 1982. Forty-six years after storm . . . glaze-damaged black cherry. Pennsylvania Forests 72(3):8–9.

66. Rexrode, Charles O., and John E. Baumgras. 1980. Gum spots caused by cambium miners in black cherry in West Virginia. USDA Forest Service, Research Paper NE-463. Northeastern Forest Experiment Station, Broomall, PA. 9 p.

67. Roach, Benjamin A. 1977. A stocking guide for Allegheny hardwoods and its use in controlling intermediate cuttings. USDA Forest Service, Research Paper NE-373. Northeastern Forest Experiment Station, Broomall, PA. 30 p.

68. Shepps, V. C., G. W. White, J. B. Droste, and R. F. Sitler. [n.d.] Glacial geology of northwestern Pennsylvania. Pennsylvania Department of Internal Affairs, Bulletin G-32. Harrisburg. 59 p.

69. Smith, H. Clay. 1965. Effects of clearcut openings on quality of hardwood border trees. Journal of Forestry 63:933–937.

70. Stanton, B. J., and H. D. Gerhold. 1988. Family and family x nitrogen interaction effects on juvenile growth of ***Prunus serotina.*** Canadian Journal of Forest Research 18:1531–1534.

71. Stout, Susan Laurane, and Ralph D. Nyland. 1986. Role of species composition in relative density measurement in Allegheny hardwoods. Canadian Journal of Forest Research 16:574–579.

72. Stout, Susan L., David A. Marquis, and Richard L. Ernst. 1987. A relative density measure for mixed species stands. Journal of Forestry 85(7):45–47.

73. Trimble, G. R., Jr. 1973. Response to crop-tree release by 7-year-old stems of yellow-poplar and black cherry. USDA Forest Service, Research Paper NE-253. Northeastern Forest Experiment Station, Upper Darby, PA. 10 p.

74. Trimble, George R., Jr. 1968. Growth of Appalachian hardwoods as affected by site and residual stand density. USDA Forest Service, Research Paper NE-98. Northeastern Forest Experiment Station, Upper Darby, PA. 13 p.

75. U.S. Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. U.S. Department of Agriculture, Agriculture Handbook 436. Washington, DC. 754 p.

76. Walters, Russell S. 1985. Black cherry provenances for planting in northeastern Pennsylvania. USDA Forest Service, Research Paper NE-552. Northeastern Forest Experiment Station, Broomall, PA. 6 p.

77. Wendel, G. W. 1972. Longevity of black cherry seed in the forest floor. USDA Forest Service, Research Note NE-149. Northeastern Forest Experiment Station, Upper Darby, PA. 4 p.

78. Wendel, G. W. 1975. Stump sprout growth and quality of several Appalachian hardwood species after clearcutting. USDA Forest Service, Research Note NE-239. Northeastern Forest Experiment Station, Upper Darby, PA. 9 p.

79. Wenzel, David. 1970. Soil-ecology report for the owls nest survey. USDA Forest Service, Eastern Region, Milwaukee, WI. 81 p.

80. Yeager, A. F., and E. M. Meader. 1958. Breeding better fruits and nuts. University of New Hampshire Agriculture Experiment Station, Station Bulletin 448. Durham. 24 p.