Prunus pensylvanica L. f. Pin Cherry

Rosaceae Rose family

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Pin cherry *(Prunus pensylvanica)* is a small common tree inhabiting a great variety of lands in the northern part of the United States and Canada. It is sometimes called fire cherry for its value as a reforesting agent after forest fires. It forms pure stands that provide shade for seedlings of slower growing species, then dies off, making way for the new trees. Another common name, bird cherry, reflects the prevalent use of the fruit by birds as food. It is also called northern pin cherry, wild red cherry, and pigeon cherry. The soft porous wood is of little commercial value.

Habitat

Native Range

Pin cherry (fig. 1) grows from Newfoundland and Labrador west to southern Mackenzie District and British Columbia in Canada. Scattered stands are found south in the Rocky Mountains to Montana and Colorado; southeastward from the Black Hills of South Dakota to Iowa, Illinois, Pennsylvania, and New Jersey, northeast to New England. In the Southeast its range follows the Appalachian Mountains south to northern Georgia and eastern Tennessee.

Climate

Throughout the range of pin cherry, the mean annual number of days with minimum temperatures below 0" C (32" F) is 90 in the southern Appalachians to more than 180 in the northern and western part of the range (28). Normal annual total precipitation ranges from 2030 mm (80 in) in the Great Smoky Mountains to 410 mm (16 in) in the western part of the range. Mean annual total snowfall ranges from 61 cm (24 in) in the southern Appalachians to 254 cm (100 in) in the northern part of the range. Normal daily temperatures vary widely throughout the range of pin cherry:

	Southeast		Northeast and West	
	C°	F°	C°	F°
January max.	10"	50"	-1"	30"
July max.	27"	80"	29"	85"
January min.	-4"	25"	-23"	-10"
July min.	16"	60"	4"	40"

Soils and Topography

Pin cherry grows on infertile rocky ledges, sandy plains, moist loamy soils, and rich loams *(14)*. Throughout the Appalachian Mountains, the soils fall into the general order of Inceptisols. In New England and eastern Canada, Spodosols predominate. Around the Great Lakes, Alfisols are the major order with some Histosols and Spodosols. In the Rocky Mountains of the United States and Canada pin cherry grows on soils belonging to the general orders of Alfisols, Entisols, and Mollisols.

On bituminous coal banks in central Pennsylvania, pin cherry and trembling aspen are the most abundant pioneer tree species and may account for 33 percent of the plant cover in 10 years *(6)*. Pin cherry usually follows the distribution of Kellogg's great soil groups — Podzol, Gray-Brown Podzolic, and Lithosol *(19)*.

In the White Mountains of New Hampshire, pin cherry is a major component in rock and soil slide successions but is usually far more numerous after wind-throw, logging, or light fires because its presence depends on seed buried in the forest floor *(11)*. In the aspen communities of the Lake States, pin cherry is abundant on the moist and clayey soils *(7)*.

Pin cherry, though mainly a northern species, regenerates naturally throughout most of its range after a heavy cutting or fire. In the central and southern Appalachian Mountains, it is most common at elevations above 915 m (3,000 ft). On the "heath" balds at higher elevations in the southern Appalachians, pin cherry may be a major component. In New England, pin cherry stands are underlain by a wide range of soils including unstratified glacial till derived from acidic and relatively infertile parent materials. The soils are shallow, well-drained Spodosols and range from very stony to extremely stony sandy loams to loams.

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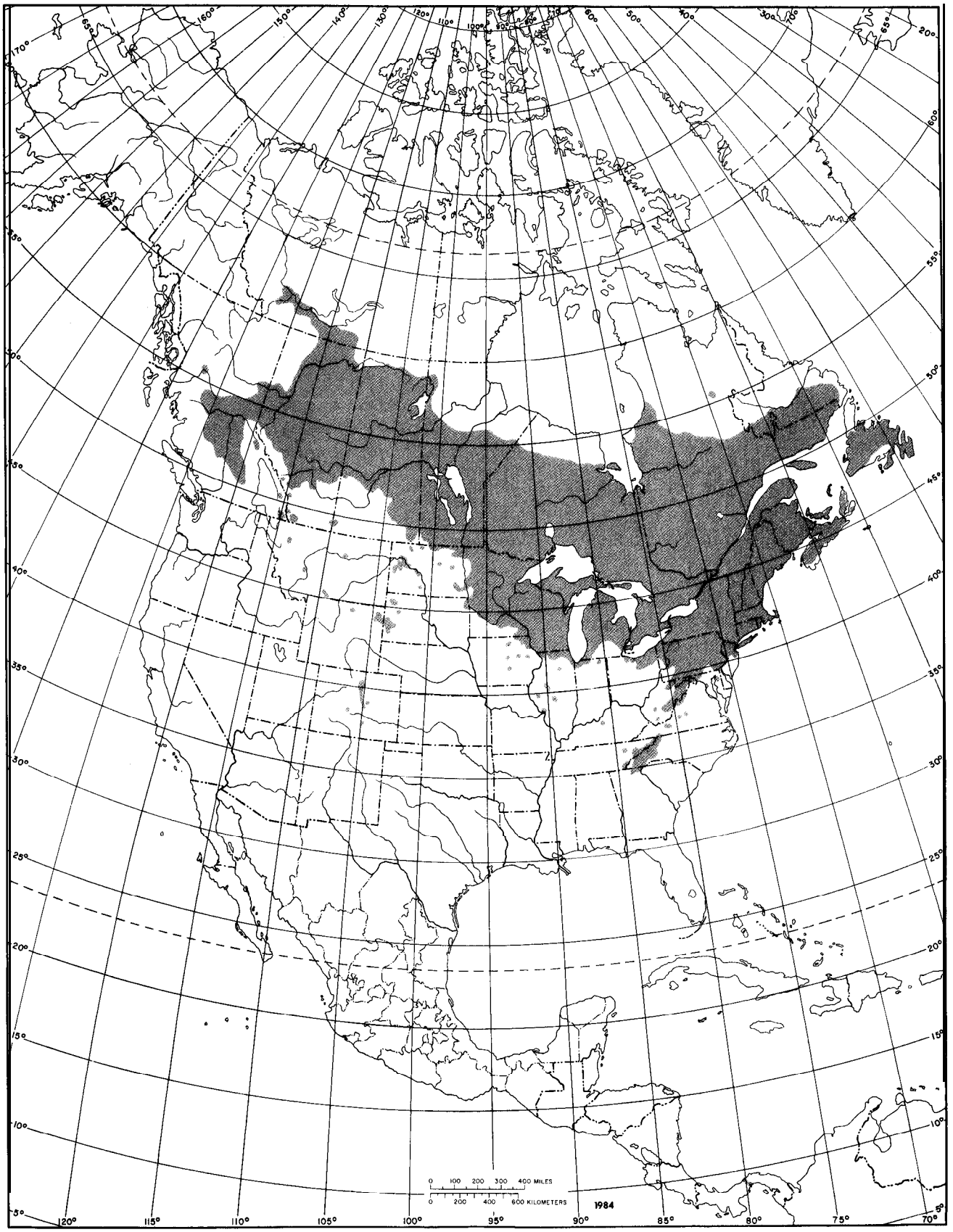

Figure *l-The native range of pin cherry.*

Associated Forest Cover

Pin cherry, in pure stands or as a majority of the stocking, is the forest cover type Pin Cherry (Society of American Foresters Type 17) *(14)*. It is frequently associated with quaking aspen and bigtooth aspen *(Populus* ***tremuloides*** and ***P. grandidentata)*** paper birch and yellow birch *(Betula* ***papyrifera*** and ***B. alleghaniensis),*** striped maple, red maple, and sugar maple *(Acer* ***pensylvanicum, A.*** *rubrum*, and ***A. saccharum)***, American beech *(Fagus* ***grandifolia),*** northern red oak ***(Quercus rubra),*** balsam fir ***(Abies*** *balsamea)*, and red spruce *(Picea rubens)*. Fraser fir ***(Abies*** *fraseri)* and American mountain-ash *(Sorbus* ***americana)*** are additional associates in the southern Appalachians. Chokecherry and black cherry ***(Prunus virginiana*** and *P.* ***serotina)*** are common associates in the Lake States.

Pin cherry is a component of the following forest cover types:

16 Aspen
17 Pin Cherry
18 Paper Birch
19 Gray Birch-Red Maple
20 White Pine-Northern Red Oak-Red Maple
21 Eastern White Pine
25 Sugar Maple-Beech-Yellow Birch
28 Black Cherry-Maple
32 Red Spruce
34 Red Spruce-Fraser Fir
60 Beech-Sugar Maple
108 Red Maple

In addition to the understory tree species in pin cherry stands, numerous shrubs and forbs occur, including blackberry *(Rubus* spp.), redberry elder *(Sambucus pubens)*, hobblebush ***Viburnum alnifolium),*** American ***yew*** *(Taxus* ***canadensis),*** dwarf raspberry *(Rubus pubescens)*, wild sarsaparilla *(Aralia* ***nudicaulis),*** largeleaf aster ***(Aster*** *macrophyllus)*, mountain aster ***(A.*** *acuminatus)*, violets ***(Viola*** spp.), bracken ***(Pteridium aquilinum),*** spinulose woodfern ***(Dryopteris spinulosa),*** and shining clubmoss ***(Lycopodium lucidulum)*** *(14)*.

Life History

Reproduction and Early Growth

Flowering and Fruiting-Pin cherry flowers from late March to early July. Flower buds are formed in August or September of the preceding year (17). In Warren County, PA, flowers appear from May 1 to May 15. The perfect flowers are white and 12 to 16 mm (0.47 to 0.63 in) broad with long pedicels; they are borne in corymbs or umbels and expand with the leaves. The globose fruits ripen from July to September, depending on locality. They are light red, 5 to 7 mm (0.20 to 0.28 in) in diameter, and have thin, acid flesh and subglobose stones 4 to 5 mm (0.16 to 0.20 in) long *(9,10,16)*. Fruiting occurs as early as age 2 in natural stands in Pennsylvania *(16)*. Sexual maturity of natural dominant trees in New Hampshire may be attained during the fourth growing season though large quantities of fruits are not produced until several years later (23).

Seed Production and Dissemination-Fruits are dispersed by gravity and to a much lesser degree by birds and small mammals after the fruits ripen in July ***(12).*** The weight of cleaned seeds per 45 kg (100 lb) of fruit ranges from 7 to 12 kg (16 to 27 lb). The number of cleaned seeds per kilogram ranges from 17,600 (8,000/lb) to 48,100 (21,800/lb) and averages about 31,300/kg (14,200/lb) ***(16).***

In a 4-year study on the Monongahela National Forest in West Virginia, trees with an average d.b.h. of 12 cm (4.7 in) yielded 0.64 liter (0.68 qt) of fruit per tree (26). Half the trees bore fruit, and fruit yields varied substantially from year to year. Fruits were produced at 3- to 4-year intervals. In New Hampshire, dominant trees produced some fruit at 4 years, but quantity production occurred later.

Despite its short life span of about 30 years, fruit production in pin cherry is high. For 15-year-old, open-grown trees in pure stands, annual fruit production was estimated at 2,762,500 fruits per hectare (1,118,000/acre). For 25-year-old pin cherry stands in the same area of New Hampshire, annual seed production was 2,324,500/ha (940,700/acre) (23).

Many seeds remain buried in the soil in areas where pin cherry once grew. Some seeds are disseminated by birds that excrete or regurgitate the seeds at a distance from their source, and some are moved by mammals *(1,23)*. In two areas in New Hampsire, the average number of viable pin cherry seeds in the forest floor ranged from 345,000/ha (139,676/acre) to 494,000/ha (200,000/acre) (23). In other New Hampshire stands, depending on stand age, the number of viable seeds in the forest floor ranged from 10,000 to 1,110,500/ha (4,050 to 450,000/acre) *(15)*. It has been estimated that some seeds buried in the soil retain their viability for 50 to 150 years *(15,22)*.

Seedling Development-Pin cherry germination is epigeal and most pin cherry reproduction arises from seed stored in the forest floor. In natural stands in northwestern Pennsylvania, Marquis (24) reported 36,800/ha (14,900/acre), 14,100/ha (5,700/acre), and

46,700/ha (18,900/acre) pin cherry seedlings germinating after removal of one-half, two-thirds, and all of the overstory, respectively.

In New England, more pin cherry seedlings germinated from soil blocks taken from 38- and 95-year-old stands than from 5- or 200-year-old stands *(15).* More than 70 percent germinated during the first summer in the 38- and 95-year-old stand samples. The number of germinating seeds was 2, 111, 52, and 1 per m^2 (from fewer than 1 to 10/ft^2) for the 5-, 38-, 95-, and 200-year-old stands, respectively.

In the central Appalachians in West Virginia, dense thickets of pin cherry frequently develop after clearcutting 40- to 70-year-old hardwood stands. On two areas 5 years after clearcutting, there were between 2,470 and 7,410 pin cherry seedlings/ha (1,000 and 3,000/acre) 0.3 m (1.0 ft) high and up to 2.5 cm (1.0 in) in d.b.h. and between 680 and 990 stems/ha (275 to 400/acre) 2.5 to 12.7 cm (1.0 to 5.0 in) d.b.h. *(25).*

A small amount of pin cherry seed probably germinates annually in northern hardwood stands. However, seedlings have been reported to survive only in large openings where light and moisture were more available. The largest number of pin cherry seedlings appeared in response to major disturbances such as heavy cutting or burning (23). In one study, mechanical removal of the endocarp and a cool temperature, 15" C (59" F), promoted better pin cherry germination. The germination rate of pin cherry was greatly improved by soaking seed for 24 hours in a chemical solution (0.5 M hydroxylammonium chloride) followed by a series of drastic temperature fluctuation treatments (20). With this treatment the seed germination rate was more than 75 percent. Often pin cherry seed germination is less than 10 percent when seed viability is 100 percent. It appears that the factor triggering increased germination of buried pin cherry seed following forest disturbance is the more extreme temperature fluctuation created by removing the overstory *(20).* Although the factors accounting for the natural germination of pin cherry could not be determined exactly, apparently (a) time is needed to age the endocarp so it becomes more permeable to water and oxygen, and (b) changes in soil and water chemistry in response to the altered microclimate of a disturbed site or to other conditions is necessary (22).

In northeastern Pennsylvania, pin cherry germination generally increased with light under no moisture stress, but under normal moisture stress, germination was best under partial shade. Under heavy shade, pin cherry seedling mortality is high, but with increasing light, survival is increased. Growth of seedlings is rapid and directly related to the amount of light received (24). Repeated applications of N to existing sawtimber stands could reduce the pin cherry component in future stands. In situations where pin cherry outgrows other more desirable species after regeneration cuttings, N fertilization might benefit maturing stands by increasing growth rates of residual trees and reducing the numbers of pin cherry seeds that would germinate and later compete with preferred reproduction (2).

Ripened fruits of pin cherry should be collected from trees or from the ground in late summer. For storage the pulp should be removed and the seeds stored in sealed containers at 1" to 3" C (34" to 38" F). Seed viability has been retained for up to 10 years under these conditions *(12).*

For nursery sowing, pin cherry seed should be stratified in moist sand for 60 days at alternating temperatures of 20° to 30" C (68" to 86" F) and for 90 days between 3" to 5" C (37" to 41" F) *(16).*

Vegetative Reproduction-Because pin cherry suckers readily, it should grow well from root cuttings. Sour cherry is often grafted on pin cherry root stocks, but budding is a more common practice *(3,29).*

Sapling and Pole Stages to Maturity

Growth and Yield-Information on the growth and yield of pin cherry is scarce. In thickets, it forms a closed canopy in 3 to 7 years and reaches maturity in 20 to 40 years *(14).* On dry, compact glacial till soils in New Hampshire, where pin cherry may comprise 50 percent of the species composition in sapling stands, mean annual biomass production was 3290 kg/ha (2,931 lb/acre), mean annual basal area growth was 1.30 m^2/ha (5.66 ft^2/acre), mean annual d.b.h. growth was 2 mm (0.08 in), and mean annual height growth was 0.23 m (0.75 ft) *(21).*

When young stands of northern hardwoods are cut, nearly pure stands of pin cherry often become established. When the pin cherry dies, the succession is to sugar maple and beech. When older stands are cut and the initial density of pin cherry is lower, the succession is towards quaking aspen and bigtooth aspen, yellow birch and paper birch. On lower elevations in New England and south through the Appalachians, the succession is to the White Pine–Northern Red Oak-Red Maple, White Pine, Red Spruce, or Red Spruce-Fraser Fir types, or to the northern hardwood types *(14).*

Pin cherry growth is rapid, and it is not uncommon for trees growing on better sites in the central Appalachians to reach 20 to 25 cm (8 to 10 in) in diameter in 25 years (fig. 2) (25). Pin cherry rarely

persists in eastern upland hardwood forests in the United States for more than 35 years *(2)*.

Annual biomass production, including belowground material, in 6-year-old stands of pin cherry was about 1660 g/m^2 (0.34 lb/ft^2), which is higher than production in other temperate climate forests *(22)*.

Rooting Habit-Once a seedling attains a height of about 1 m (3 ft), lateral roots begin rapid growth (17). In New England, root systems in 4- to 14-year-old stands were found to be shallow, generally not over 36 cm (14 in) deep, and to have many lateral branches (23). In West Virginia, root systems of wind-thrown trees 25 years old were found to be confined to the upper 61 cm (24 in) of soil (25). New shoots can arise from pieces of root left in the soil following site disturbance. Root cuttings, about 10 cm (4 in) in length, rooted 33 percent when incubated in soil under favorable greenhouse conditions *(17)*.

Reaction to Competition-Pin cherry is **classed** as very intolerant of shade. Early height growth is rapid, and where there is a high concentration of buried seed to produce seedlings after cutting or burning, pin cherry usually is dominant over all other vegetation.

In dense stands, the canopy closes in about 3 years, shading out many of the early intolerant species. After 25 to 30 years, sugar maple, beech, and in the northernmost regions, balsam fir are the seral species. At intermediate densities, pin cherry may be codominant with yellow birch, paper birch, and quaking aspen. At low densities, dominance is shared by many species including blackberries, striped maple, paper and yellow birch, quaking aspen, and stump sprouts of cut trees (23).

Damaging Agents-Many diseases attack pin cherry during its short life. The most common leaf disease is cherry leaf spot, *Coccomyces hiemalis,* which is recognized by purplish to brown shot holes in the leaves that eventually cause yellowing of leaves and premature leaf fall. Repeated attacks reduce tree vigor. Other leaf spots on pin cherry are caused by *Cercospora circumscissa, Coryneum carpophyllum,* and three species of *Phyllosticta.* Additional pin cherry diseases are powdery mildew, *Podosphaera oxyacanthae* var. *tridactyla;* rust, *Tranzschelia pruni-spinosae;* and leaf curler, *Taphrina cerasi.*

The most widespread and commonly observed disease of pin cherry is black knot, *Apiosporina morbosa (31).* Extensive trunk rot in the East is caused by *Fomes pomaceus.* This decay delignifies the wood, which then becomes soft, stringy, and discolored with brown flecks and streaks *(18).*

Most of the important insects that attack pin cherry are leaf feeders, but because of the low ecomomic value of pin cherry, they are considered unimportant. A major leaf feeder is the uglynest caterpillar, *Archips cerasivoranus* (Fitch) and occasionally the eastern tent caterpillar, *Malacosoma americanum (17,30).* Other leaf feeders are the cherry leaf beetle, *Pyrrhalta cavicollis,* a relative of the elm leaf beetle; Bruce spanworm, *Operophtera bruceata;* fall canker worm, *Alsophila pometaria;* and a web-spinning sawfly, *Neurotoma fasciata* (4). Many other insects attack *Prunus,* but there are only a few references to their attacks on pin cherry.

Special Uses

Twenty-five species of nongame birds, several upland game birds, fur and game mammals, and small mammals eat pin cherry fruit. Buds are eaten by upland game birds, especially sharp-tailed and

Figure *O-Twenty-year-old pin cherry trees on the Fernow Experimental Forest, near Parsons, WV.*

ruffed grouse. Foliage and twigs are browsed by deer. However, the foliage has a high calcium to phosphorous ratio which is undesirable for good deer nutrition. Except in dense thickets, pin cherry provides only fair nesting cover and materials for birds. Beavers cut pin cherry and may completely remove small stands (12). Leaves are poison (hydrocyanic acid) to livestock under certain conditions. However, the toxicity of pin cherry leaves is lower than that of most other cherry species *(17)*.

Because of its early place in succession and its rapid growth, pin cherry is important for minimizing losses of nutrients from an ecosystem. The rapid development of early successional species, such as pin cherry, channels water from runoff to evapotranspiration, thereby reducing erosion and nutrient loss; modifies the microclimate which reduces the rate of decomposition of litter and production of soluble ions; and incorporates into the developing biomass nutrients that do become available (22).

In general, pin cherry is not used for lumber and is considered a noncommercial species. It occurs in abundance, however, over a wide range of sites and produces large quantities of biomass in a relatively short time. The species has been described as well adapted to intensive management and chip harvesting on short rotations for fiber and fuel *(13)*. At least one paper company accepts pin cherry along with other hardwood species in West Virginia (8). Undoubtedly, it is also mixed with hardwoods in other areas.

In the nursery trade, pin cherry has been used as a grafting and budding stock for sour cherry *(12,29)*.

Genetics

One variety has been described in Canada, *Prunus pensylvanica* var. *mollis (5)*.

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