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Ulmus crassifolia Nutt. Cedar Elm

Ulmaceae Elm family

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Cedar elm *(Ulmus crassifolia)* grows rapidly to medium or large size in the Southern United States and northeastern Mexico, where it may sometimes be called basket elm, red elm, southern rock elm, or olmo (Spanish). It usually is found on moist, limestone soils along water courses with other bottomland trees, but it also grows on dry limestone hills. The wood is very strong; the lumber is mixed with other southern elm species and sold as rock elm. Its seeds are eaten by several species of birds. Within its range, cedar elm is often planted as an ornamental shade tree. It has the smallest leaves of any native elm and is one of two that flower in the fall.

Habitat

Native Range

Cedar elm (figs. 1, 2) can be found from extreme southwestern Tennessee, Arkansas, and eastern and

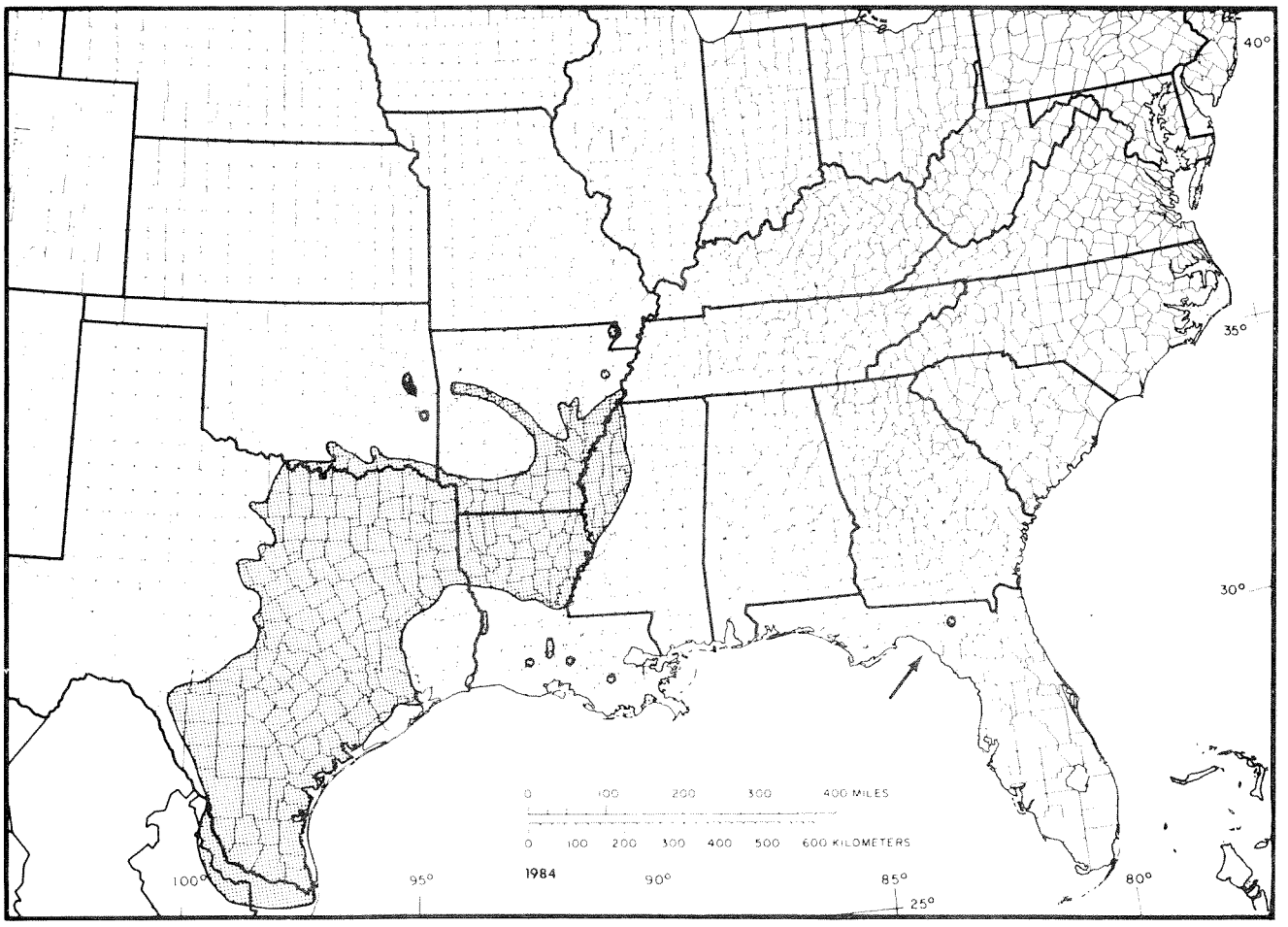

Figure 1—*The native range of cedar elm.*

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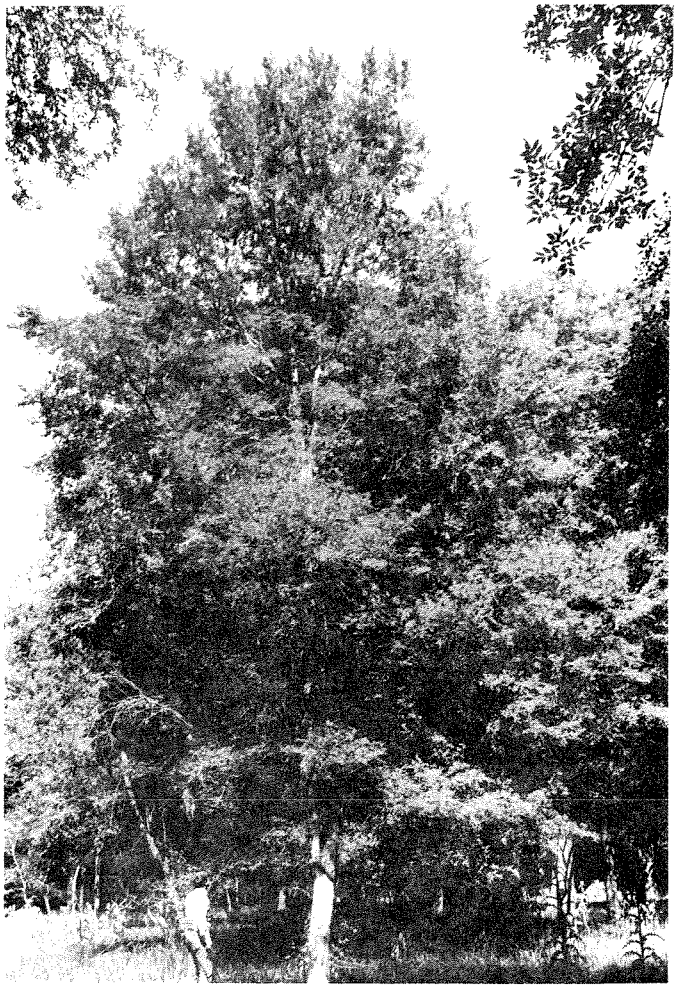

Figure 2—*Cedar elm growing with other bottom-land trees near Apple Springs, Trinity County, TX.*

southern Oklahoma; south to central and southern Texas into the adjacent northeastern Mexican states of Nuevo Leon and Tamaulipas *(15)*; and east to Louisiana and western Mississippi. There is an isolated population in northern Florida *(5,10)*.

Climate

Cedar elm grows mainly in the Gulf Coastal Plain, which has relatively mild temperatures throughout the year. The average January temperature in the region is 8° C (46° F). Oklahoma and Arkansas average 5° C (41° F), while temperatures sometimes reach 17° C (63° F) in southernmost Texas. The average July temperature is 28° C (82° F) *(17)*.

The five main States in which cedar elm is found have an average annual rainfall of 1140 mm (45 in). South Texas averages 460 mm (18 in), while eastern and central Louisiana receive an average annual rainfall of 1470 mm (58 in). The average number of days without a killing frost is 236. All of the States have a minimum growing season of 220 days.

Soils and Topography

Cedar elm thrives in deep rich soils (Inceptisols) in the Mississippi Delta and along streams in Arkansas, Louisiana, Oklahoma, and Texas, where it becomes a large tree along the Colorado and Brazos Rivers *(2,15)*. Cedar elm grows on dense, poorly drained clay soils (Vertisols) in central Texas. It also can be found on dry limestone hills in Texas and Oklahoma, but the tree is small and scrubby in this environment.

Associated Forest Cover

On dry limestone hills of the central Texas "cedar brakes," cedar elm can be found with Ashe juniper *(Juniperus ashei)*, live oak *(Quercus virginiana)*, hackberry *(Celtis occidentalis)*, Shumard oak *(Quercus shumardii)*, Mohr oak *(Q. mohriana)*, and Durand oak *(Q. durandii)*. On the floodplains of major rivers, cedar elm is a minor component of the following forest cover types *(6)*: Sweetgum–Willow Oak (Society of American Foresters Type 92), Sugarberry–American Elm–Green Ash (Type 93) and Overcup Oak–Water Hickory (Type 96).

In addition, a variant of Cedar Elm–Water Oak–Willow Oak (Type 92) is found on low, indistinct or flattened first bottom ridges with poorly drained soils. The variant is also of minor importance on some impervious terrace sites, amounting to high shallow flats.

Other common associates are pecan *(Carya illinoensis)*, eastern cottonwood *(Populus deltoides)*, red maple *(Acer rubrum)*, waterlocust *(Gleditsia aquatica)*, honeylocust *(G. triacanthos)*, persimmon *(Diospyros virginiana)*, laurel oak *(Quercus laurifolia)*, water oak *(Q. nigra)*, winged elm *(Ulmus alata)*, blackgum *(Nyssa sylvatica)*, boxelder *(Acer negundo)*, and (rarely) baldcypress *(Taxodium distichum)*.

Life History

Reproduction and Early Growth

Flowering and Fruiting—Cedar elm flowers from August to September and fruit ripens from September to October *(19)*. However, flowering dates have been reported as early as July and fruiting as late as November *(20)*. When flowers appear in

August, fruit ripens in September, and then a second flowering and fruiting may occur in October and November, respectively *(15)*.

Flowers are in fascicles of three to five on slender, pubescent pedicels 8 to 13 mm (0.31 to 0.51 in) long, located in the axils of the leaves. The hairy, red-to-green calyx is divided beyond the middle into four to eight equal and acute lobes, and the stamen is composed of five or six slender filaments and reddish purple anthers. Flowers are perfect *(19)*.

Seed Production and Dissemination—The green fruit, or samara, is oblong and flattened, deeply notched at the apex, 6 to 13 mm (0.25 to 0.5 in) long, and pubescent, especially along the margins. The seed within is unsymmetrical, acute, and covered with a dark chestnut-brown coat. Cleaned seeds average 147,700/kg (67,000/lb). Dissemination is by wind and germination occurs the following spring.

Seedling Development—Air-dried seeds may be stored at 4° C (39° F) for at least 1 year. Stratification at 5° C (41° F) for 60 to 90 days before sowing can improve germination. The seeds should be covered with soil about 5 mm (0.2 in) deep. Germination is epigeal. Approximately 5 to 12 percent of the viable seed produce plantable stock *(19)*. The seedlings can usually be outplanted after one growing season in the nursery.

Vegetative Reproduction—Cedar elm is commonly grown from seed. Though no reference is made to species in the literature, cedar elm can probably be propagated vegetatively like other elms by layering, air-layering, and from greenwood cuttings.

Sapling and Pole Stages to Maturity

Growth and Yield—Cedar elm is classified as a medium to large tree. Reports of height at maturity range from 6 m (20 ft) in the Edwards Plateau of Texas to near 30 m (98 ft) *(2,4)*. The national champion big tree from Limestone County, TX, is 28.7 m (94 ft) tall. Mature trees average approximately 90 cm (36 in) in d.b.h.

Cedar elm has an unusual cross-section that may be triangular, almost square, or deeply irregularly scalloped. The annual growth rings are very indistinct. Thus there may be considerable error in estimating the average growth rate *(3)*. In the early 1950's the Southern Forest Experiment Station estimated a volume of about 5.7 million m^3 (1 billion fbm) in the total United States area *(4)*.

Rooting Habit—The tree is relatively shallow rooted in early life. It is resistant to root pruning in the nursery. In later life the trees are moderately tolerant of soil compaction or disturbance of the root systems *(21)*.

Reaction to Competition—The literature contains no information on tolerance of cedar elm to vegetative competition or tolerance to shade, drought, or other physiological stresses. Observation of seedlings and of crown class, however, strongly suggests that cedar elm should be classed as intermediate in tolerance to shade.

Damaging Agents—Cedar elm is susceptible to the Dutch elm disease caused by the fungus *Ceratocystis ulmi*, which is carried chiefly by the native elm bark beetle *(Hylurgopinus rufipes)* and also by the smaller European elm bark beetle *(Scolytus multistriatus)*. The disease does not seem to be as harmful to cedar elm as to the American elm *(Ulmus americana)*. The offspring of *U. crassifolia* × *parvifolia* crosses indicated an apparent increase in disease resistance *(14)*.

A vascular wilt easily confused with Dutch elm disease and harmful to cedar elm is caused by *Ceratocystis ulmi*. Again, cedar elm is not as susceptible to the disease as is American elm. In Mississippi, only 8.5 percent of 25 large trees 18 cm (7 in) in d.b.h. and larger and 1 percent of 132 small trees 15 cm (6 in) in d.b.h. and smaller were affected by the disease, as opposed to 37 percent of the large and 5.7 percent of the small American elms *(8)*.

Cedar elm also has been found fairly resistant to Texas root rot *(Phymatotrichum omnivorum) (9)*, but only slightly resistant or nonresistant to heartwood decay caused by several species of *Fomes* and *Polyporus (18)*. The symptoms of elm phloem necrosis caused by the mycoplasmalike organism *Morsus ulmi* have been suppressed in American and cedar elm by injections of tetracycline antibiotic *(7)*.

In Texas, Spanish moss *(Tillandsia usneoides)* frequently drapes the branches of cedar elm; it weakens the branches and may kill the tree *(15)*.

The elm leaf beetle *(Pyrrhalta luteola)* is hosted by all species of elm throughout the United States, but it causes only occasional, slight damage to cedar elm *(1)*.

Special Uses

The seeds are part of the diet of several bird species. In south Texas, 10 percent of the diet of the plain chachalaca consists of cedar elm seeds *(11)*. Wild turkey in Texas use elm seeds and buds for 5

to 10 percent of their diet *(12)*. In addition, squirrels eat the buds.

Cedar elm is frequently planted as an ornamental shade tree in Oklahoma and Texas *(21)*.

Cedar elm flowers about the same time as the ragweeds and is known to cause or to complicate later summer hayfever *(5)*.

The wood is known for its great strength and exceptionally good shock resistance. Its specific gravity and shrinkage are quite similar to those of rock elm *(Ulmus thomasii) (4)*. Because their wood is anatomically similar, cedar elm, rock elm, winged elm, and September elm *(U. serotina)* are all classified as "rock elm." They are most easily distinguished by differences in the ultraviolet fluorescence of the aqueous extracts of the heartwood *(16)*.

Because of its similarity to rock elm, cedar elm can be used as a substitute for rock elm *(4)*. It is most suitable for the manufacturing of furniture and fence posts. The wood also is excellent for steam bending and therefore is used to make containers such as boxes, baskets, crates, and barrels. Other products made from the wood include caskets and dairy, poultry, and apiary supplies.

Cedar elm leaves can be used as indicators of the severity of air pollution. The sulfate content of leaf samples shows the long-term exposure to sulfur dioxide, which is related to overall pollution levels *(13)*.

Genetics

Open pollinated hybrids between Chinese elm *(Ulmus parvifolia)* and cedar elm *(U. crassifolia)* have been recorded *(14)*.

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