Ulmus alata Michx. Winged Elm

Ulmaceae Elm family

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Winged elm *(Ulmus alata)* is a very hardy, small- to medium-sized tree in a wide range of habitats throughout much of the southern Midwest and Southeastern United States. Other common names are cork elm and wahoo.

On fertile soils with adequate moisture and drainage, winged elm grows well and is a useful component of several forest types. On poor dry sites it is stunted and gnarled and can be an undesirable invader of grazing land. Winged elm lumber is mixed with other elm. This tree is occasionally planted in southern landscapes.

Habitat

Native Range

Winged elm (figs. 1, 2) extends from southern Virginia west to Kentucky, southern Indiana and Illinois, and central Missouri; south to central Ok-

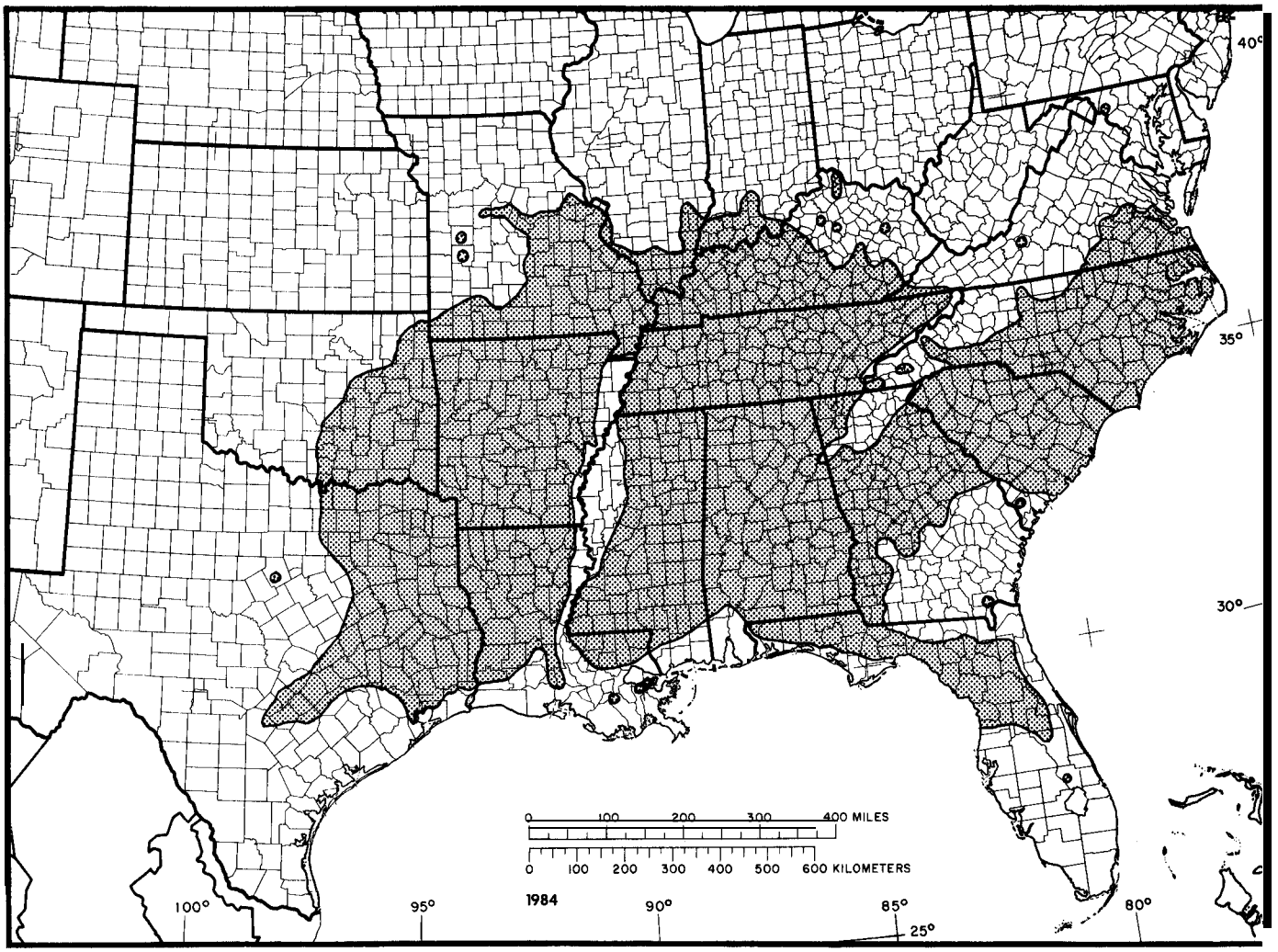

Figure *l-The* native *range of winged elm.*

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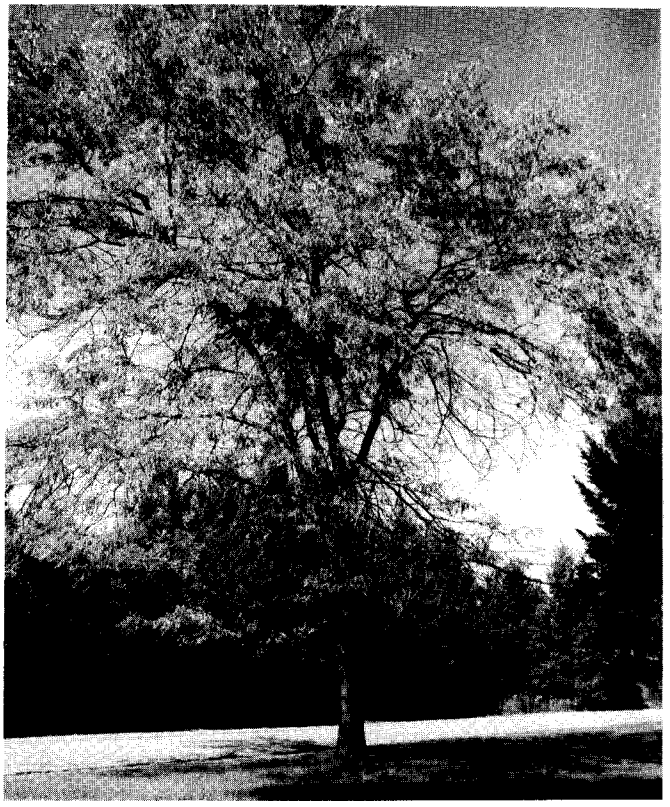

Figure *2-Winged elm.*

lahoma and southeastern Texas; and east to central Florida. It is also found locally in Maryland *(10,14).*

Climate

Within the natural range of winged elm, the climate varies from warm in the South to moderately cold in the North *(20).* The region is principally within the humid climatic province of the southeastern United States. Annual precipitation averages 1020 to 1520 mm (40 to 60 in); half or more of this occurs during the growing season, April to September. Throughout the greater portion of the tree's range, the growing season averages from 180 to 300 days, and average annual temperatures are from 13" to 21" C (55" to 70" F). Average annual snowfall is from 38 cm (15 in) in the North to none in the South.

Soils and Topography

Winged elm is found on a great variety of soils. It grows fairly well on dry as well as on rich, moist soils. The species does particularly well in the silty uplands in Mississippi where site index values at base age 50 years are 21.3 to 27.4 m (70 to 90 ft) on Memphis soils (4). On the Delta bottom lands it grows on terrace flats with tight silty soils of the order Inceptisols. In southern Illinois, it grows in old abandoned fields and along fence rows on upland clay soils. The species is generally associated with intermittent streams and other moist, lower slope sites. In the hill country of Tennessee and North Carolina, it may be found on upper or middle slopes, however. It is listed in forest types that are found at elevations up to 760 m (2,500 ft). The species is also common on sandy soils in bottom lands near Dallas, TX *(11).* Overall, winged elm is most commonly found on soils of the orders Alfisols and Ultisols.

Associated Forest Cover

Winged elm generally grows only as scattered trees in mixture with other hardwoods *(14).* It is not a major component of any forest cover type in the Eastern United States, but it is found in varying amounts in four major types *(17):* Post Oak-Blackjack Oak (Society of American Foresters Type 40), White Oak–Black Oak-Northern Red Oak (Type 52), Swamp Chestnut Oak-Cherrybark Oak (Type 91), and Sugarberry-American Elm-Green Ash (Type 93).

In the southern part of the Central Forest Region, winged elm occurs as a minor species in Post Oak–Blackjack Oak. From the Central Forest Region southward through Tennessee, Arkansas, Mississippi, and Alabama it is associated with White Oak–Black Oak-Northern Red Oak. In the Southern Forest Region and within flood plains of major rivers, winged elm is found in either Swamp Chestnut Oak–Cherrybark Oak or in Sugarberry-American Elm–Green Ash. Here, associated understory trees are eastern hophornbeam *(Ostrya uirginiana),* American hornbeam ***(Carpinus caroliniana),*** and American holly *(Ilex opaca).*

Life History

Reproduction and Early Growth

Flowering and Fruiting-The perfect flowers of winged elm are borne on threadlike pedicels in short, few-flowered drooping fascicles before the leaves appear in March and April *(22).* The fruit is a reddish or greenish samara, ovate to oblong and 6 to 8 mm (0.25 to 0.33 in) long. Fruits ripen in April and seeds are dispersed the same month (3). The seed is solitary and it and its wing are flat and hairy, espe-

cially on the margin. The reddish samaras give the tree a reddish appearance when fruiting.

Seed Dissemination-Seeds are disseminated by wind and water. They are eaten by a variety of birds and small animals which likely serve as another means of dissemination.

Seedling Development-Germination is epigeal (3). The cotyledons are oval with shallowly notched apexes and heart-shaped bases (9). They are light green and smooth on both surfaces and persist on the plant for 1 to 2 months. The first leaves appear within 1 week after germination, They are small and sharp-pointed and have typical elm venation. The stem is circular, zig-zag, and slightly hairy to smooth. Two corky wings develop opposite each other on the stem late in the first year. The buds are slender and sharp-pointed, chestnut brown, slightly hairy, and 1.6 mm (0.06 in) long.

Winged elm is a light-demanding species and reproduction is often sparse in an understory *(1).* It is an invader of forest openings, old fields, and rangelands. It survives grazing as bushes and sprouts prolifically (15). Winged elm is difficult to kill with herbicides and its eradication has been the subject of several rangeland studies during the past decade *(18).*

Vegetative Reproduction-No information is currently available on the sprouting and rooting habits of winged elm.

Sapling and Pole Stages to Maturity

Growth and Yield-Winged elm is a medium-sized tree, usually 12 to 15 m (40 to 50 ft) in height but occasionally 24 to 30 m (80 to 100 ft), and is rarely more than 61 cm (24 in) in d.b.h. This species develops a short bole with branches ascending into a fairly open, round-topped crown. It has a lacy, or somewhat drooping habit. One special characteristic is the corky, persistent wings or projections often found on the branches. Winged elm grows rapidly in the open. Under forest conditions its growth rate is usually considered poor in relation to its associates. Diameter growth in a natural stand averages 50 to *64* mm (2.0 to 2.5 in) in 10 years *(12).*

Rooting Habit-No information available.

Reaction to Competition-Of all species of elms native to the United States, winged elm is perhaps the least tolerant of shade. It is, nevertheless, classed as a shade tolerant species *(15).* Normally, winged elm is not associated with standing water except in intermittent pools and shallow sheets of water after heavy rains. Winged elm is classified as tolerant of flooding *(19).*

Damaging Agents-A large variety of insects and diseases are reported for winged elm *(2,7,8).* This is not because the species is generally more susceptible to pathogens than other native hardwoods. The primary reason is that the species is susceptible to *Ceratocystis ulmi,* which causes Dutch elm disease, and to the mycoplasmalike organism which causes elm phloem necrosis. Both have been devastating to the elms native to North America and since these diseases are both transmitted by insects, a large amount of research has been done on all insects and diseases of elms in the United States. The Dutch elm disease is most prevalent across the northern portion of the natural range of winged elm. As of 1976, it had not been found in Louisiana and Florida *(21).* Phloem necrosis was distributed throughout much of the north and central range of winged elm by 1975 (6). Both diseases have spread into the Southeastern States from the north; whether or not the warmer climate or other factors in these States will eventually stop the epidemics remains uncertain.

Special Uses

For commercial purposes the wood of winged elm is classed as hard elm or rock elm *(5,13).* Elm wood is used principally for furniture, hardwood dimension and flooring, boxes, and crates. Elm's excellent resistance to splitting has made it a choice wood for the manufacture of high quality hockey sticks. The manufacture of furniture continues to increase the demand for elm for bent parts of chairs such as rockers and arms.

The mast from winged elm is eaten by birds and animals, and the twigs and leaves are important for white-tailed deer *(16).* Both twigs and leaves are most succulent, nutritious, and digestible during spring and are less useful as food the rest of the year because after abscission, the leaves lose most of their quality and digestibility.

Genetics

Winged elm has little commercial value. As a consequence, no attempts to hybridize or improve the species have been reported.

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