

Silvical Characteristics of Winged Elm

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(Ulmus alata Michx.)

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A single species of winged elm (Ulmus alata Michx.) is recognized (5). Other common names are wahoo, hard elm, rock elm, and white elm. It is found principally in southeastern United States, ranging westward from the borders of swamps and streams in southeastern Virginia, southwestern Indiana, southern Illinois (Richland and Johnson counties) to southern Missouri (fig. 1). Southward it is found in central Florida (Lake County) and the valley of the Guadalupe River, Texas, and as far west as Garfield County in Oklahoma (9).

HABITAT CONDITIONS

CLIMATIC

The distribution of winged elm is principally within the humid climatic province of the southeastern United States, according to Thornthwaite's classification (12). Annual precipitation within its growing area averages 45 to 60 inches as recorded for the period 1899-1938. One-half or more of this precipitation falls within the warm months--April to September. Throughout the main part of the tree's commercial range, the growing season averages from 180 to 300 days, and average annual temperature from 55° to 70° F. Average annual snowfall varies from 0 inches in the extreme southern range to 15 inches in the north, and the number of days with snow cover ranges from 0 days in the south to 20 days in the north (13).

EDAPHIC AND PHYSIOGRAPHIC

The soil requirements of winged elm are much the same as for American elm. As evidenced by its range, the species can be found on a great variety of soils occurring in southeastern United States. Winged elm grows fairly well on dry as well as on rich, moist soils (14). Its best development is principally on loamy flats (as in the Mississippi River Delta). On the latter bottomlands it occurs widely on terrace ridges and colluvial sites. Occasionally it is found

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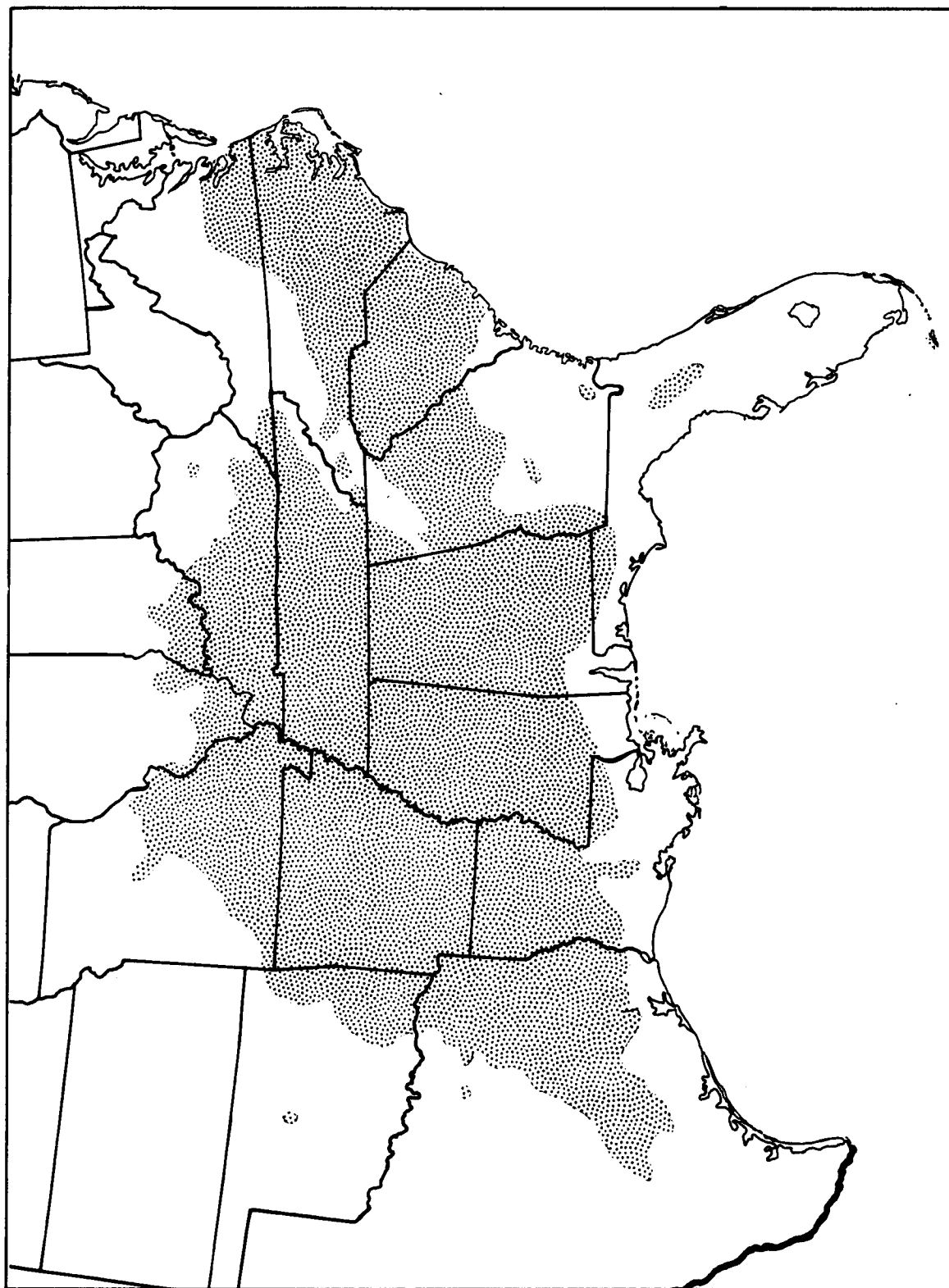


Figure 1.--Botanical range of winged elm.

on high terrace flats with tight silty soils (7). Normally, winged elm is never associated with standing water except in the form of intermittent pools and shallow sheets after heavy winter rains (8). In southern Illinois, it occurs 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. However, in the hill country of Tennessee and North Carolina, it may be found on upper or middle slopes.

BIOTIC

Winged elm generally occurs only as scattered trees in mixture with other hardwoods. It is not a major component of any forest cover type in eastern United States, but is found in varying amounts in five major cover types. In the Central States it occurs as a minor species in the post oak-black oak type. From the Central States southward through Tennessee, Arkansas, Mississippi, and Alabama it is associated with the eastern redcedar-hardwood type or in the white oak-red oak-hickory cover type. In the Southern Forest Region and within flood plains of major rivers, winged elm is found in either the swamp chestnut oak-cherrybark oak type or in the sugarberry-American elm-green ash association (10).

Tree species associated with winged elm vary by locality and site. In bottomland or flood plain areas, the chief associates are swamp chestnut oak (Quercus michauxii), cherrybark oak (Quercus falcata var. pagodaefolia), American elm (Ulmus americana), green ash (Fraxinus pennsylvanica), willow oak (Quercus phellos), blackgum (Nyssa sylvatica), hickories (Carya spp.), red maple (Acer rubrum), sweetgum (Liquidambar styraciflua), southern red oak (Quercus falcata), yellow-poplar (Liriodendron tulipifera), and American beech (Fagus grandifolia). It is also found in the loblolly-hardwood type (8).

In the Southern Forest Region, common weed tree associates are eastern hophornbeam (Ostrya virginiana), American hornbeam (Carpinus caroliniana), and sassafras (Sassafras albidum). In Arkansas, holly (Ilex opaca) is a common weed tree associate.

LIFE HISTORY

SEEDING HABITS

Flowering and fruiting. -- The perfect flowers are vernal, appearing before the leaf buds unfold. They are borne on drooping pedicels in short, few-flowered fascicles. The fruit is a samara, ripening before or with the unfolding of the leaves, one-third inch in length and tipped at the apex with long incurved awns and covered with long white hairs (9). Very little is known about the effects of climatic factors on the flowering and fruiting of winged elm. Little or nothing is known of the effects of animals, birds, insects, and diseases on the flowering and fruiting of this species. Four species of game birds are known to consume elm seed. These are the ruffed grouse (Bonasa umbellus), bobwhite (Colinus virginianus), Hungarian partridge (Perdix perdix perdix), and pinnated grouse (Tympanuchus cupido). Elm seed

have been taken from the stomachs of the opossum (Didelphis virginiana virginiana), cottontail rabbit (Sylvilagus floridanus), and snowshoe hare (Lepus americanus). It is reported to be heavily browsed by the white-tailed deer (Odocoileus virginianus) (16).

Winged elm is not a tree of primary importance; hence knowledge concerning seed production and vegetative propagation is meager.

SEEDLING DEVELOPMENT

The specific requirements for the germination and survival of winged elm seedlings have not been studied, so little can be said concerning seedling establishment. A study recently conducted at the University of Missouri shows that winged elm seedling development is best at one-half sunlight intensity. One-half light intensity resulted in the greatest height growth of winged elm, while best growth for American elm was at one-third light intensity. From this test, winged elm was found to be a light-demanding species when associated with American elm and red maple (6). In flood-plain areas of the Delta Region, reproduction is prolific in openings but very sparse as an understory (8).

SAPLING STAGE TO MATURITY

The winged elm is medium in size, usually from 40 to 50 feet in height, occasionally 80 to 100 feet, developing a short bole, 1 to 1½ feet in diameter, with branches ascending into a fairly open, round-topped crown (fig. 2). It has a lacy, or somewhat drooping, habit. One special characteristic is the corky, persistent wings, or projections, often found on the branchlets (4). In the absence of natural stands of commercial importance, volume and yield values are not available. Winged elm in open shade-tree conditions grows rapidly but many of its hardwood associates will exceed the diameter growth of the species in the open. Under forest conditions its growth rate is usually considered poor in relation to its associates (7).

The principal use of winged elm is in standard hardwood lumber which is usually mixed with American elm and handled by the trade as soft elm (4). Other minor uses are for boxes, baskets, crates, and barrels. Occasionally it is used for furniture, caskets, ties, pallets, and vehicle parts. The wood is heavy, hard, and close-grained, and it is difficult to split. The wood of winged elm does not possess great strength (9).

Two of the most important diseases attacking winged elm are the Dutch elm disease (Ceratostomella ulmi) and phloem necrosis virus (1). These diseases are still primarily a problem in shade trees and as yet not serious in forest stands. The species is subject to top dieback of varying degree, the cause of which has been undetermined.



Figure 2.--A typical open-grown winged elm standing on the School Forest of Clemson College, Clemson, S. C.

As with American elm, this tree is attacked by a long list of insect defoliators, bark beetles, borers, and sucking insects, but the damage is largely confined to shade trees (3, 15). The smaller European elm bark beetle (Scolytus multistriatus) and the elm leaf hopper (Scaphoideus luteolus) are important as vectors of the Dutch elm disease and elm phloem necrosis, respectively (11). The red-shouldered hickory borer (Xylobiops basilaris) damages the wood of dying trees and green logs of winged elm (2).

LITERATURE CITED

- (1) Baxter, Dow Vawter
1943. PATHOLOGY IN FOREST PRACTICE. 618 pp., illus. New York and London.
- (2) Beal, James A., Haliburton, William, and Knight, F. B.
1952. FOREST INSECTS OF THE SOUTHEAST: WITH SPECIAL REFERENCE TO SPECIES OCCURRING IN THE PIEDMONT PLATEAU OF NORTH CAROLINA. Duke Univ. Forestry Bul. 14, 168 pp., illus.
- (3) Craighead, F. C.
1950. INSECT ENEMIES OF EASTERN FORESTS. U. Dept. Agr. Misc. Pub. 657, 679 pp., illus.
- (4) Harrar, Ellwood S., and Harrar, J. George
1946. GUIDE TO SOUTHERN TREES. 712 pp., illus. New York.
- (5) Little, Elbert L., Jr.
1953. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES. U. S. Dept. Agr. Handb. 41, 472 pp.
- (6) McDermott, R. E.
1954. SEEDLING TOLERANCE AS A FACTOR IN BOTTOMLAND TIMBER SUCCESSION. Mo. Agr. Expt. Sta. Res. Bul. 557, 11 pp., illus.
- (7) Putnam, John A.
1951. MANAGEMENT OF BOTTOMLAND HARDWOODS. U. S. Forest Serv. South. Forest Expt. Sta. Occas. Paper 116, 60 pp.
- (8) _____ and Bull, Henry
1932. THE TREES OF THE BOTTOMLANDS OF THE MISSISSIPPI RIVER DELTA REGION. U. S. Forest Serv. South. Forest Expt. Sta. Occas. Paper 27, 207 pp.
- (9) Sargent, Charles Sprague
1933. MANUAL OF THE TREES OF NORTH AMERICA (EXCLUSIVE OF MEXICO). Ed. 2, reprinted with corrections. 910 pp., illus. Boston and New York.
- (10) Society of American Foresters
1954. FOREST COVER TYPES OF NORTH AMERICA (EXCLUSIVE OF MEXICO). Soc. Amer. Foresters, 67 pp., illus. Washington, D. C.
- (11) Swingle, R. V., Whitten, R. R., and Young, H. C.
1949. THE IDENTIFICATION AND CONTROL OF ELM PHLOEM NECROSIS AND DUTCH ELM DISEASE. Ohio Agr. Expt. Sta. Spec. Cir. 80, 11 pp., illus.
- (12) Thornthwaite, C. W.
1941. ATLAS OF CLIMATIC TYPES IN THE UNITED STATES, 1900-1939. U. S. Dept. Agr. Misc. Pub. 421, 95 pp., illus.

- (13) U. S. Department of Agriculture
1941. CLIMATE AND MAN. Agr. Yearbook 1941, 1248 pp., illus.
- (14) _____
1949. TREES. Agr. Yearbook 1949, 944 pp., illus.
- (15) _____
1952. INSECTS. Agr. Yearbook 1952, 780 pp., illus.
- (16) Van Dersal, William R.
1938. NATIVE WOODY PLANTS OF THE UNITED STATES; THEIR EROSION-CONTROL
WILDLIFE VALUES. U. S. Dept. Agr. Misc. Pub. 303, 362 pp., illus.

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