

smaller ones, probably as an indirect result of the cuts in federal aid.

Tree care agencies in our state spend less of their time actually working on tree care when compared to the national average, primarily schedule work as a result of requests, but end up spending about the same proportion of time on planting, pruning and removal as do other cities in the nation.

Inventories have been taken in nearly one-third of the communities surveyed, but do not appear to be utilized for systematic tree care.

On the average there are fewer street trees than are found in comparable cities in other regions of the country. Shade tree managers buy nearly all of their trees from commercial nurseries and plant the same type of trees as do other cities in nearby states.

Nearly three-fourths of the communities in New Jersey have tree ordinances, but the largest cities are less satisfied with their ordinances than are the smaller ones. Public tree bodies are widely established here and are more frequently found in smaller cities.

Unfortunately, the most urban state does not appear to be much different than the rest of the nation in general level of tree care it gives its communities. A conclusion would be that whatever "lead" it seemed to have at the turn of the century has been lost due to budget cuts, lack of interest or higher priority items as identified by public administrators and political decision makers.

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EUCOMMIA ULMOIDES: A TREE FOR URBAN AREAS

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Eucommia ulmoides Oliv. (Family Eucommiaceae), with its numerous attributes, frequently has been recommended for general use in urban areas (6,8,9). In overall form and leaf character, the species resembles American elm. Mature trees attain heights up to about 60 ft, have wide-spreading branches, and leaves that are glossy green. Although lacking in fall color, the leaves have the desirable characteristic of dropping fairly fast and, therefore, compared with other species of trees, the cleanup period is short. The flowers

are inconspicuous and the fruit are compressed winged nutlets, much like those of the elm. But, despite these favorable traits, trees of this species are seldom seen.

The purpose of this article is to summarize various trial plantings and the propagation of this dioecious, deciduous tree from central China. The chemical properties of the species are described including the nature of a substance in the leaves that mistakenly has been called rubber. With this additional information, anyone considering grow-

ing or using this species in the landscape may better appreciate its attributes and its probable geographic range of adaptability. Even so, until the species has been grown in a wide range of environments, its adaptability must continue to be speculative.

Trial Plantings

Thirty-four trees were planted in 6-ft treelawns along Liberty Street, in Cleveland, Ohio, in 1952 (Fig. 1). The trees had been grown from seed received from Indianapolis, Indiana, but the origin of the seed is unknown (pers. comm. John Michalko). Currently, these trees are about 14 inches dbh and from 25 to 30 ft tall. No problem has been encountered with insect pests or with limbs that droop and interfere with traffic, unlike many species of trees used in urban areas. The trees have needed little maintenance. Unusually cold temperatures of about -20°F in the city in the winters of 1977 and 1978 resulted in slight dieback in the crowns of the trees but this dieback was subsequently obscured by new growth. Winds up to 50 miles per hour at the time caused little limb breakage in the trees (pers. comm. William Killmer).

In fall, 1982, the city of Cleveland planted about 60 new trees that had been grown from seed collected from the Liberty Street trees. The trees

were planted in narrow treelawns along a street on which salt to melt snow is applied each winter, in an industrial area where the air contains particulates originating from nearby steel mills. The possible adverse effect of these substances on survival and growth of the trees is being studied.

Trees planted at the Ohio Agricultural Research and Development Center at Wooster, Ohio, have varied in performance. Generally, they have grown quite satisfactorily, except for some small ones in the shade tree evaluation plots that were killed at temperatures of -20°F . These and some small trees at Indianapolis, Indiana, earlier had sustained moderate storm damage. The species appears to be adaptable to soils ranging well above pH 7.0, but is intolerant of fine-textured soils with poor drainage (pers. comm. Davis Sydnor).

In 1972, five trees were planted by the author in a canyon campground east of Logan in northeastern Utah. Winter temperatures there regularly go to -20°F or lower. Only two trees survived and they are no bigger now than when planted because of winter-kill of the new shoots each year.

Propagation

Propagation of *Eucommia ulmoides* has been no



Fig. 1. Chinese threadtrees (*Eucommia ulmoides*) along Liberty Avenue, Cleveland, Ohio. Planted in 1952, the trees were photographed by William Killmer in 1974.

problem. Lake County Nursery Exchange, Perry, Ohio, has seed-propagated trees in general production, with quantity sale of caliper-size stock scheduled for 1985. Sexually propagated trees also are in production at Saratoga Horticultural Foundation, Saratoga, California. Softwood cuttings taken in mid-June from a mature tree in Illinois were successfully rooted (8). The benefits of root-promoting chemicals for this purpose were reviewed at a meeting of plant propagators (11).

Chemical Properties

Foote (5) described how World War I interrupted sources of supply of tu-chung bark from *Eucommia ulmoides* trees, the source of an unidentified "valued tonic medicine." The article pictured a man in Yungyang Hsien, China, shouldering a wooden pole with a large bundle of this bark hanging from each end.

When a leaf of *Eucommia ulmoides* is broken and the pieces separated, delicate, silvery threads form between them. These threads consist of a substance that is an isomer of the hydrocarbons of rubber (7), known as gutta (2). Present in the latex of *Eucommia*, some *Euonymus* species, and several species of Malaysian trees, gutta differs from rubber in that it is plastic and not elastic. It dissolves in ether, carbon disulfide, and chloroform about twice as fast as crude rubber (10). Before dissolving, crude rubber swells greatly but retains its original proportional shape, whereas the substance from *Eucommia ulmoides* only softens and flattens out on the bottom of the container. Commercial *Eucommia* plantations, apparently for gutta production, have existed in Russia since intensive vegetative propagation of original source male plants began about 1931 (4).

Common Name

The mistaken identity of the gutta in *Eucommia ulmoides* and the species' hardiness in temperate environments have resulted in the species being called, "hardy rubber tree." For accuracy, it could be called "hardy gutta tree" or "gutta-percha tree," a name of long standing in Russia (12). This latter name, together with the species' country of origin, is the basis of another common name, "Chinese Rukkis Tree" (1). The common name for

this tree in China is "tu chung" (3), a name incapable of precise English translation. Use of the name, "Chinese treadtree," in reference to the country of origin and to the threads that connect separated leaf parts, may increase public interest in this intriguing species. The numerous attributes of *Eucommia ulmoides* or Chinese threadtree contradict its relative scarcity in the United States.

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