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LITTLE-KNOWN ASIAN ELMS: URBAN TREE POSSIBILITIES[1]

by George H. Ware

Abstract: Five species of elms native to northern Asia are discussed as trees for possible urban use in the United States. At least a part of the natural range of each species extends into the areas with great temperature fluctuations and low rainfall. The rationale is that elm species from regions with harsh climates in Asia should prove suitable for planting in similar regions of North America. Such trees should also tolerate stresses associated with urban conditions in these North American regions.

The vigorous growth of Siberian elm (*Ulmus pumila* L.) as a planted tree over a vast area of North America leads one to the question, "Are there any more at home like you?" Admittedly, the faults and shortcomings of Siberian elm are numerous, but its hardiness, its vigor and adaptability and its tolerance of adverse conditions suggest that other elms from the regions of naturally-occurring Siberian elm may be worth investigating. The range of Siberian elm is geographically extensive, mostly in regions with continental climates, having not only great extremes in temperature, but also deficient moisture.

One approach is to seek out Asian regions with climate similar to the North American region for which the elms are sought. Climatic analogues for the corn belt and plains states of the U.S. are found in northern China north of the Yellow River where temperature and moisture conditions approximate those of the corn belt states near the coast and the Dakotas in interior regions (C.I.A., 1971). In addition to Siberian elm, there are several other elm species occurring throughout this region of Asia.

In a list of associated tree species in the original forests of the northeastern provinces of China, Wang (1961) lists five species of elm, one of which is *U. pumila*. Wang's list contains many species of trees for which urban-use potential is known for North America. Because the list contains close ecological associates, it provides information on the attributes and potential of lesser-known species, including elms.

Descriptions of the elms discussed below were obtained primarily from *Iconographia Cormophytorum Sinicorum,* Tomus I, Peking, 1972. Mr. Peter Wang, Cataloger of the Morton Arboretum Library, provided translation of the descriptions. Additional ecological information was obtained from Wang (1961) and Ptitsin (1939).

Ptitsin describes *Ulmus macrocarpa* Hance as the giant fruited elm because its samaras are as much as 2.5 to 3 cm in diameter. He states that it is a medium-sized tree (in Manchuria) that is not at all common but may be seen in scattered groups upon hilly or mountainous slopes, especially in areas of disintegrating rocks. He further notes that it is tolerant of great temperature extremes, poor soil conditions, high winds and blizzards, and severe drought.

According to Ptitsin, the leaves of *U. macrocarpa* are large, broadly ovate, and abruptly terminate in a short but pronounced tip. The twigs usually develop two corky wings during the second or third year. The wood is described as one of the hardest known to the local people. Three-year-old seedlings may attain heights of two to three meters.

The natural range of *U. macrocarpa* includes northern China, Mongolia, Korea, and Siberia.

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This species occurs as a medium-sized tree in favorable humid areas and as a small tree or shrub in the cold arid areas far inland. The promise of *U. macrocarpa* lies in its impressive tolerance of hostile soil and climatic conditions. Aesthetically it may not be especially impressive, but its potential for performing well in urban sites is good.

In the past, seeds of *U. macrocarpa* received at the Morton Arboretum have produced very slow-growing seedlings. However, a recent seed lot from Harbin, Manchuria, has produced seedlings that have attained heights of 30 cm, with six to eight pairs of leaves, in just one month.

U. glaucescens Franch. is a little-known elm with a natural range extending into the very dry regions of Kansu Province, but occurring also over a large area of northern China. It is a small tree that develops longitudinal stripes on its twigs. The leaves are rather small, somewhat resembling those of Siberian elm. The fruits are unusually large, approaching the size of those of *U. macrocarpa*. An interesting feature is that flowers develop at the same time as leaves. In most elms, flowering occurs well ahead of leafing. Yellow to orange fall coloration is still another feature.

The ecological qualities of this elm are such that tolerance of urban conditions is probably good, but little or nothing is known of its arboricultural attributes. Seedlings under observation at the Morton Arboretum have grown quite well with long vigorous shoots appearing on two-year-old plants.

Ulmus davidiana Planch. occurs naturally in northern China and Manchuria. It is quite drought tolerant and does best in limestone areas. It is a medium-sized tree with a rounded, spread-out crown. The wood is very durable. Because of its tolerance of difficult sites and its drought resistance, this elm would probably adapt satisfactorily to urban conditions. Much more observation of living material and study of herbarium specimens will be needed to understand *U. davidiana* as a taxon.

U. laciniata (Trautv.) Mayr. is a small to medium-sized tree of humid areas of Manchuria, northern China, Korea, Siberia, and Japan. The growth form in Japan is with slender, upright branches emerging from a single point, creating a somewhat ungraceful effect. There appears to be considerable variation in the crown form in the populations of this elm on the mainland of Asia. A characteristic often present is three horn-like lobes serving as leaf tips. Adaptability of this elm for urban use may depend upon the part of the range from which seeds are collected. Plants from harsher habitats in Manchuria and northern China may be more useful than Japanese material. Material being grown at the Morton Arboretum from the Botanical Garden of the Academy of Sciences at Frunze, Kirghiz S.S.R., appears to have hybridized freely with *U. pumila*. Unfortunately, provenance of both parents is unknown, but presence of fruiting *U. laciniata* specimens in

Figure 1. An early spring view of a 55-year-old hybrid elm (*U. japonica* × *U. wilsoniana*) that has masses of highly glossy foliage that suggest loose layers. Height of tree is about 50 feet.

the quite arid Frunze area suggests drought hardiness.

U. japonica Sarg. is widely grown in botanical gardens and arboreta but is rarely seen as a street or park tree. In Japan this elm attains a height of 25 to 30 meters and a diameter of two to three feet. The general appearance is that of American elm (*U. americana* L.), and it appears that Japanese elm would make a desirable substitute for American elm. There seems to be a great deal of variation among populations of this elm on the Asian mainland, with resemblance to *U. davidiana* creating confusion in identification. The natural range is Japan, Korea, Manchuria, Mongolia, northern China, and Siberia. Thus, procuring material of *U. japonica* from cold, arid regions is possible, and such material may provide the best prospective urban trees.

Elm seedlings from seed lots received from botanical gardens, arboreta, and experiment stations must be identified very cautiously in view of the possibility of hybridization. On the other hand, hybridization may provide opportunities for selections of new kinds of elms. In 1924, the Morton Arboretum received a packet of seeds labeled *U. crassifolia* Nutt. This elm, commonly known as cedar elm, occurs in Texas and nearby states. In time, specimens were planted throughout the Arboretum grounds, and today there are ten half-century-old trees displaying ten attractive but different crown patterns. Experimentation indicates that these trees are hybrids involving parentage of *U. japonica* and *U. wilsoniana* Schneider. Figure 1 shows a tree with somewhat upright branches. Some of the specimens have intensely glossy leaves and whitish, finely plated bark — both features of *U. wilsoniana.* The University of Wisconsin cultivar 'Sapporo Autumn Gold' was selected from a group of trees grown from seeds of *U. japonica* received from Hokkaido, Japan, among which were numerous hybrids of *U. japonica* X *U. pumila* (Smalley and Lester, 1973).

The Asian species described not only provide immense variation in populations with generally large geographic ranges, but also offer possibilities for hybridization. Numerous elm crosses have been described, some even involving spring and autumn-flowering species (Santamour, 1972; Townsend, 1975). Involvement of *U. pumila* generally imparts vigor and adaptability desirable for urban trees. It is likely that use of *U. pumila* in crosses involving other elm species of northern Asia would produce a range of elm types tolerant of adverse urban planting conditions. Utilization of the vigor of *U. pumila* combined with desirable form, wood strength, and foliage qualities of other elms, may produce useful selections. The enrichment of elm collections with population representatives of species of known provenance from throughout the ranges of the northern Asian elms will provide material for coping with advertsities not yet apparent.

Unfortunately, the word "elm" presently evokes negative responses from many persons selecting trees for urban use. But if attributes necessary for tolerating urban stresses are sought, elms must be given a high rating. An important rationale for selecting Asian elms is that most of them show some degree of resistance to Dutch elm disease (Lester, 1978).

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Dendrologist
The Morton Arboretum
Lisle, Illinois