

## EVALUATION OF SOME LITTLE-KNOWN ASIAN ELMS FOR URBAN USE

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**ABSTRACT** -- Siberian elm (*Ulmus pumila*) is widely planted in the Midwest and Great Plains but has some drawbacks associated with rampant growth and branches vulnerable to wind and ice breakage. 99 Descriptions of qualities of eight other Asian species indicate some potential substitutes for Siberian elm. *U. davidiana* appears to have superior promise as an urban tree, especially with its tolerance of adverse sites. Elm species discussed are *U. davidiana*, *U. japonica*, *U. szechuanica*, *U. wilsoniana*, *U. propinqua*, *U. macrocarpa*, *U. lamellosa*, and *U. glaucescens*.

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There are quite a number of elms from temperate regions of Asia besides the well-known Siberian elm (*Ulmus pumila*), often known to homeowners as "Chinese elm". True Chinese elm is *U. parvifolia*, increasingly called lace-bark elm because of its reddish mottled bark with flaking scales. Both these elm species are much better known than the eight species treated in the following discussion. The chief basis for the information presented is observation at the Morton Arboretum, Lisle, Illinois, for the past 20 years, and four visits to China. The Morton Arboretum is in Horticultural Zone 5.

Siberian elm (*Ulmus pumila*) is widely planted in the United States and is especially common in the Midwest and Great Plains. It was one of the species used for shelterbelt plantings during the drought years of the 1930's. Its vigor and rampant growth effectively fulfilled its conservation role (Webb, 1948). Its promise as a tree for townscapes was lessened by its vulnerability to storm damage and ice breakage. Despite its shortcomings, it is still commonly planted as a tree to create quick shade. Extensive outbreaks of elm leaf beetle conspicuously disfigure its foliage and mar the summer appearance of streetscapes of countless towns of the Midwest and Great Plains where Siberian elm is often the most abundant street tree. Experience with Siberian elm has stigmatized to some extent all elms associated with Asian origins. Besides Siberian elm, there are more than 20 species and varieties of elms native to China. These China elms appear to have good levels of resistance to both Dutch elm disease and elm yellows (phloem necrosis) (Carter and Carter, 1974).

Observations at the Morton Arboretum indicate that some of the elm species from China have excellent promise as urban trees.

Also, determination of geographic and ecological origins and edaphic affinities in their homeland suggests good suitability for their use as urban trees.

In his *Ulmus* monograph, Fu (1980) considers *U. davidiana* to include a number of related taxa. In this discussion four of these taxa are treated as species because of their separate geographic ranges, special ecological attributes and distinctive qualities related to their promise as useful landscape trees. The *U. davidiana* complex includes: *U. davidiana*, *U. japonica*, *U. wilsoniana*, and *U. propinqua*. Fu recognizes the closely related *U. szechuanica* as a separate species. All of these elm groups have medium-sized leaves and branching patterns somewhat similar to those of American elm (*U. americana*). A distinctive difference is that all five have numerous obovate leaves in contrast to the ovate leaves of American elm (Figure 1).

All four taxa of the *U. davidiana* complex and *U. szechuanica* appear to have promise as urban trees. *U. davidiana* as observed in Heilongjiang Province in northeastern China has several favorable features that seem to equip it for successful urban use. In Heilongjiang, it attains a height of 12 to 15 meters. The resemblance of countryside specimens in Heilongjiang to American elm is remarkable. Foliage has a deep green color with impressive glossiness. Leaves are mostly obovate, slightly plicate, and slightly smaller than those of American elm. Spontaneous trees colonize open areas, pastures, and riverine places. Tolerance of poor soils is good.

*U. japonica* occurs in the same regions as *U. davidiana* but is closely associated with forest land. *U. japonica* was observed in Heilongjiang as a tall tree (20 to 25 meters) with a somewhat dominant central trunk. It appeared to be associated with well-drained slopes as an integral part of the forest community. Open-grown specimens appeared to be remnants following logging. Even these specimens retained a narrow crown. From the same seed source, specimens of *U. japonica* growing on well-drained soil at the Morton Arboretum have done well but specimens growing on clayey soils have grown very slowly. In contrast, specimens of *U. davidiana* at the Morton Arboretum appear to tolerate clayey soils satisfactorily.

*U. szechuanica* is native to the upper Yangtze River region in Szechuan and Hupeh Provinces. It appears to be a forest tree, growing best in well-drained soils. It is a small to medium tree (8 to 10 meters) with a spreading umbrella-like crown. Emergent foliage is reddish for several weeks in springtime. Bark is dark grayish-black with superficial peeling vertical scales. *U. wilsoniana* is related to *U. szechuanica* but appears to be a somewhat larger tree. *U. wilsoniana* also develops a spreading crown with wand-like branches elongating well into summer. Reddish emerging foliage is also a feature of *U. wilsoniana*. In contrast to the dark bark of *U. szechuanica*, *U. wilsoniana* has light gray bark with small separate vertical scales. Both *U.*

*szechuanica* and *U. wilsoniana* appear to have branches less tough than those of *U. davidiana* and *U. japonica*. Both *U. wilsoniana* and *U. szechuanica* do best on well-drained soil but tolerate somewhat adverse sites. Both appear to tolerate conditions of Horticultural Zone 5 but may suffer occasional winter damage.

*U. propinqua* is a small tree (8 to 10 meters) that appears to tolerate a wide range of soil situations, but appears to be more slow-growing than other elms of the *U. davidiana* complex. The branches of *U. propinqua* are often markedly corky; pubescent twigs are reddish brown. Its obovate leaves are pubescent on both surfaces. Leaves are medium-green with no glossiness. *U. propinqua* is native to Inner Mongolia and regions beyond the forest toward grasslands in northern China. *U. propinqua* appears to have considerable promise as a landscape tree for adverse downtown places but its tolerance of seasonal soil wetness is still unknown.

Another group of Asian elms includes *U. macrocarpa*, *U. lamellosa*, and *U. glaucescens*. *U. macrocarpa* was named for its unusually large fruit which appears to be the largest fruit among all elms, with a diameter up to 3.0 cm. The leaves of this elm are large and obovate, having a somewhat acuminate tip (Figure 1). Twigs often develop corky wings that may persist for a few years. The bark becomes rough-surfaced with uneven vertical ridges. Ten-year-old trees at the Morton Arboretum resemble American elm but have a somewhat stiffer branching pattern. This elm may attain a height of 14 meters or more. It grows in generally adverse situations in the mountains of northern China. It grows best in well-drained soils and does not tolerate prolonged soil wetness or inundation. It is a suitable tree for parks, campuses, and other open areas and may also be a possibility for streetscape use.

*U. lamellosa* is related to *U. macrocarpa* but is distinguished by its flaking mottled bark. It has obovate leaves similar to those of *U. macrocarpa* but smaller. A rounded crown is supported by a slender trunk and slender branches. It appears to be a suitable tree for parks, campuses and open areas and possibly for street use. It attains a height of 10-12 meters. Fall color is a rich golden yellow.

A third species in this group is *U. glaucescens*, a small tree of northern China, from dry regions. It appears to reach 8 to 10 meters in height. It does not tolerate wet soils. Some specimens show peeling mottled bark similar to that of *U. lamellosa*. Little is known of its ecological and edaphic qualities but it appears to have limited promise as an urban tree. Its drought tolerance could be an advantage for use in the Great Plains.

These eight little-known elm species provide numerous possibilities for selection and introduction of new trees for urban landscapes. Selective hybridization among these elms is

extending the potential for developing, even tailoring elms for specialized urban uses. An interesting example is a *U. davidiana* x *U. propinqua* hybrid attaining a height of no more than 15 to 20 feet. Its strong horizontal branches make it an excellent possibility for use under power lines. Repeatedly good red fall color is a great bonus.

All eight Asian elm species appear to be essentially free of leaf miners. At the Morton Arboretum, severe infestations of leaf miners badly disfigured most European elm specimens in 1994. Also, none of the eight is very susceptible to elm leaf beetle damage. Both *U. wilsoniana* and *U. szechuanica* are scarcely touched by elm leaf beetle.

Lace-bark or true Chinese elm (*U. parvifolia*) is quite well-known and has been considered a promising urban tree for many years. It is increasingly seen on urban landscapes and several cultivars have been introduced. Winter-hardiness in the Chicago region is not entirely dependable for most selections. Further work on provenance is needed. Further testing in northern Illinois, Wisconsin, Minnesota, and Nebraska should yield some useful selections.

The richness of potential urban elm material from China and the suitability and general adversity-tolerance and attractiveness of elms support the value of promoting elms (Heybroek, 1993). Such encouragement has given impetus to continued searching for Asian elms new to North America. Seedlings and saplings of the following taxa are now being grown at the Morton Arboretum: *U. elongata*, *U. gaussonii*, *U. castaneifolia*, *U. changii*, *U. wallichiana*, *U. bergmanniana*, *U. bergmanniana* var. *lasiophylla*, and *U. propinqua* var. *suberosa*.

#### LITERATURE CITED

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Figure 1.

1. U. wilsoniana
2. U. szechuanica
3. U. lamellosa
4. U. propinqua
5. U. glaucescens
6. U. japonica
7. U. macrocarpa
8. U. davidiana

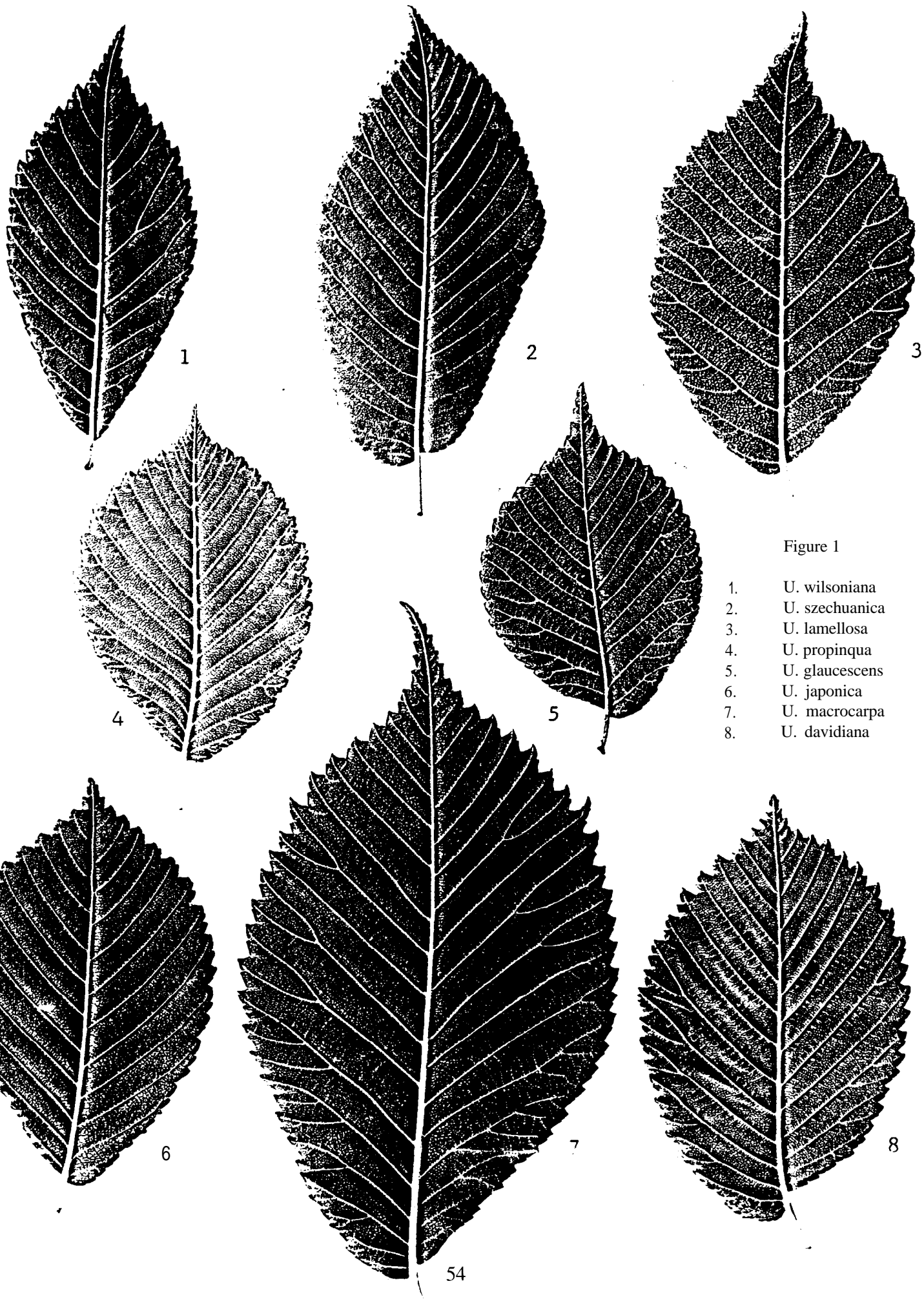


Figure 1

1. *U. wilsoniana*
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5. *U. glaucescens*
6. *U. japonica*
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